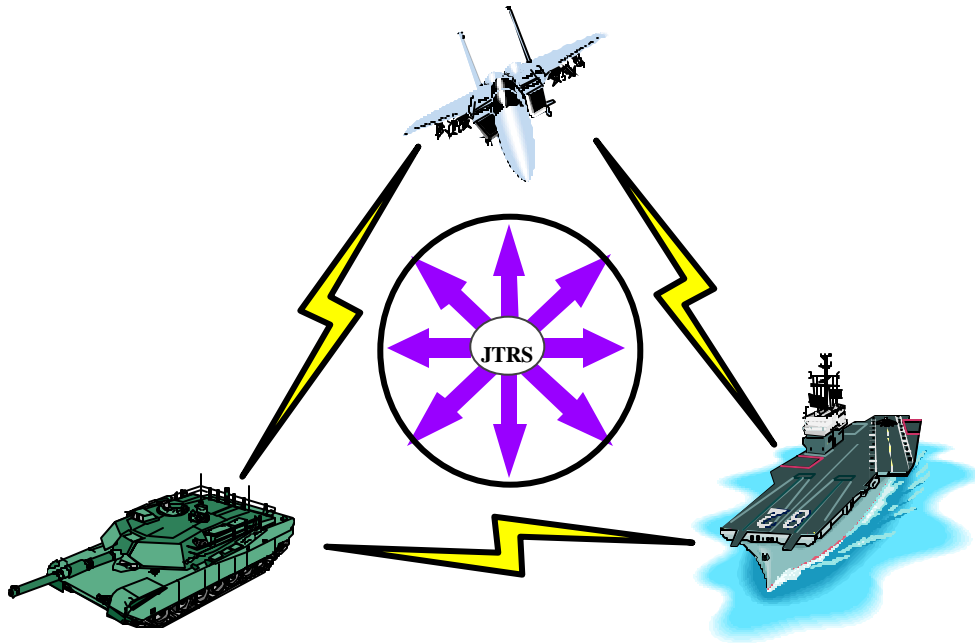


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Joint Tactical Radio System



JOINT TACTICAL RADIO SYSTEM (JTRS)

OPERATIONAL REQUIREMENTS DOCUMENT (ORD)

Version 3.2

JROC Approved, JROCM 087-03, 9 April 2003

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**OPERATIONAL REQUIREMENTS DOCUMENT (ORD)
FOR THE
JOINT TACTICAL RADIO SYSTEM (JTRS)
ACQUISITION CATEGORY: 1D**

1. General Description of Operational Capability.

a. Mission Need. The requirement for the Joint Tactical Radio System (JTRS) is documented in the Mission Needs Statement (MNS) for the Joint Tactical Radio, dated 21 August 1997. Defense planning guidance directs consolidation of service programs into an interoperable, joint program for the development and acquisition of affordable, high capacity tactical radios to meet the bandwidth needs of various echelons. The single function hardware design of legacy communications systems cannot take advantage of rapid changes in commercial technology and so cannot provide the functionality and flexibility necessary to achieve and maintain information superiority or to support the rapid mobility required by today's armed forces. Therefore, a software-programmable and hardware-configurable digital radio system is required to provide increased interoperability, flexibility, and adaptability to support the varied mission requirements of the warfighters. The JTR System lays the foundation for achieving network connectivity across the radio frequency (RF) spectrum and provides the means for digital information exchanges, both vertically and horizontally, between Joint warfighting elements, while enabling connectivity to civil and national authorities. In addition to traditional missions, such as Outside the Continental United States (OCONUS) warfighting and Continental United States (CONUS) training, the JTR System and its technologies will provide a critical foundation for Homeland Security and Defense.

b. Overall Mission Area(s). The JTR System will provide support to the combatant commander and support the joint mission area communications and computer environments as listed in CJCSM-1014. The JTR System will support the joint mission/joint mission tasks listed in the CJCSM 3500.04, Universal Joint Task List, and service specific planning guidance that require information exchanges using radio frequency transmissions. This ORD identifies the Joint operational capabilities required to support the operational concepts of Joint Vision 2020. The JTR System ORD contains linkage to the Theater Air and Missile Defense (TAMD), Close Air Support (CAS), Combat ID (CID), and the Global Information Grid (GIG) Capstone Requirements Documents (CRDs).

c. Proposed System.

(1) The JTR System will combine the functionality of numerous single function radios among the services into a single, Joint-interoperable family of radios. The JTR System will attain Joint, Federal Agencies and Public Safety, Combined, and Allied/Coalition interoperability and performance requirements. The JTR System provides tactical radio sets that may include routers, switches, and other networking components/functions integral to the set and configured to meet the diversity of host platforms. The JTR System satisfies requirements common to the three domains that coincide with

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operational missions and environments: Airborne, Maritime/Fixed, and Ground. The radio sets in the JTR System will be software-reprogrammable, multi-band/multi-mode capable, mobile ad-hoc network capable, and provide simultaneous voice, data, and video communications. Domain-specific requirements are contained in the annexes to this ORD.

(2) A family of JTR Sets will operate with many legacy waveforms currently used by military and civilian agencies, and incorporate new waveforms as they are developed. The components of the JTR System family of radio sets will be scaleable in terms of form, fit, and cost to meet specific user operational needs. The JTR System will also provide growth capability through an open system architecture that enables technology insertion through evolutionary acquisition or preplanned product improvement (P³I). The JTR System will be capable of high data throughput rates per channel that will support accurate and timely information exchanges between warfighter systems; incremental channel expansion that will increase network capacity; and high levels of reliability, availability, and maintainability; technological enhancement; and commercial support service compatibility that will enable wide-spread warfighter access to the networked resources as needed to support the various warfighter missions.

d. Missions to Accomplish. Although each of the domains supported by the JTR System has unique missions, it is the missions accomplished by Joint operations that the JTR System is designed to support. The missions of armed forces, whether they operate independently, Joint, Combined, Alliance, or Coalition, include war (i.e., deterring aggression and coercion, fighting conflicts) and operations other than war (e.g., peacekeeping, training and exercises, providing domestic disaster relief, reducing potential conflicts, promoting regional stability, humanitarian missions). Joint Vision 2020 requires seamless integration of service capabilities for Joint missions. While numerous radio sets currently support the services, the JTR System provides a family of interoperable radio sets, capable of loading multiple waveforms, to support Joint operations. The JTR System supports Joint operations by providing the capability to transmit, receive, bridge, and gateway between similar and diverse waveforms and network protocols used within the radio frequency spectrum and across service boundaries. The JTR System ensures Joint operational readiness and success by providing military commanders with the ability to communicate with their forces via voice, video, and data, during all aspects of military operations. The JTR System's networking capability and multiple waveforms (including new waveforms such as the wideband networking waveform) will allow collaboration between commanders and staffs despite geographical and organizational boundaries. In cases where a JTR Set replaces the functions of one or more legacy radio(s), the JTR Set will perform the same functions and mission(s) supported by the legacy radio(s).

e. Operational and Support Concept. The JTR System in general terms will be part of the Warfighter's toolkit that supports DoD's movement toward network centric warfare at the tactical level. The potential increase in Warfighting capabilities through the JTR System is tremendous but only if combined with effective employment. Through this combination, the JTR System will be an essential piece in producing the information superiority environment the Warfighter seeks at the tactical level. The JTR System top-level Operational and System Overviews shown in Appendix G and Appendix H of

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this ORD depicts current and future JTR System interfaces. The following operational and support concepts are intended to describe, in a macro sense, what drove the requirements listed in this document and the general support concept.

(1) Operational Concept. The operational concepts of JV 2020, as well as the individual service warfighting concepts, place a premium on information superiority as an enabler. Much as information superiority will enable the JV 2020 operational concepts to succeed, the joint family of radios that comprise the JTR System will fully integrate into the GIG to enable successful implementation of new service and joint warfighting concepts (e.g., Army Objective Force, Expeditionary Maneuver Warfare (EMW), etc.) and systems (e.g., Future Combat Systems (FCS), Warfighter Information Network – Tactical (WIN-T), Automated Digital Network System (ADNS), etc.). Specifically, the JTR System will provide the warfighters vertical and horizontal network connectivity across the radio frequency spectrum that will permit them to achieve the information dominance that is critical to the style of warfare intended in the future. To that end, the JTR System is defined as a family of radios that are modular, multi-band, multi-mode mobile ad-hoc networked communications systems that will provide the connectivity for warfighters at principally the tactical level. The JTR System capabilities will be developed and fielded in an evolutionary manner providing an increasingly more capable JTR System as technology and funding permits. This evolution will include improvements in six principal areas: bandwidth and frequency spectrum use, power use, antenna technology, processing power, networking, and modularity. JTR Sets configured for multi-channel operations will have the capability to translate certain message formats as defined by the user. The scope of message format translation shall be based on operational requirements and the capability to translate dissimilar formats within DoD and NATO. Although users may assign certain format translations to be performed by JTR Sets, it is critical for the JTR System to support network-centric warfare as demanded by the Joint Vision and as further articulated by the operational requirements of the GIG; the standards for open systems design cited in the Joint Technical Architecture; and the software design criteria contained in the JTR System Software Communications Architecture. The standards-compliant JTR System will promote clarity of functional interfaces and with modularity of software; the user may integrate functions of end-systems and JTR System in a manner that attains the most efficient operations. For example, the radio functions that support signal intelligence, combat identification and targeting could be integrated with JTR Sets to provide a means for end-systems to interrogate and reply using JTR Set waveforms.

(a) Concept Drivers. There are three overarching drivers to the requirements laid out in this document. First, there is a critical need to decrease the types of tactical radios employed by our joint forces--each for the most part requiring wholesale replacement or expensive modifications to support new operational or mission requirements. Second, our current radios are inadequate to establish the dynamic networks required for prosecuting network centric warfare—currently a major pillar in future warfare for the U.S. military. Third, the fielding of any new radio system must not create another interoperability burden on our forces (i.e., stovepipe system) but instead be a forcing function toward greater interoperability. From these overarching drivers and a basic knowledge of how our joint forces, and their service components, intend to fight, the requirements for the JTR System were developed.

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(b) Interoperability. While interoperability is one of the JTR System drivers, how interoperability is achieved is varied and is both a technical issue as well as an operational issue. The technical issue will be resolved through the open architecture design of the JTR System. Operational interoperability is an appropriate subject to be addressed individually by the Combatant Commander and Commander, Joint Task Force (CJTF). Technical interoperability will be achieved by fielding equipment that the services can operate jointly without implementing numerous temporary fixes as has been done in the past. However, to ensure overall force interoperability, a commander must implement certain joint tactics, techniques, and procedures (TTPs). For instance, a commander could use the JTR System to implement a "common waveform" concept for a specific force and operation. The common waveform could come from one of the JTR System waveforms and provide the added joint force interoperability needed during operations. Rather than seeking changes of equipment systems to fit changing operational conditions, the JTR System provides joint task force commanders the means to implement procedural changes to attain interoperability.

(c) Tactical Networks within the GIG. The establishment of robust networks across the battlefield from the tactical to the strategic level is key to future warfare. At the tactical level, the needed mobile ad hoc (flexible/scalable) networks must be able to rapidly form and seamlessly tie into the higher joint, legacy, and objective force networks to send/receive the critical information required during operations whether it is in the form of data, voice, or video. Without the dynamic RF networks that are able to move freely across the battlefield and permit the warfighter to tie seamlessly into the larger static networks, the high paced warfare envisioned by all the services cannot occur. The GIG concept emphasizes the need to seamlessly tie all these networks together and highlights the importance of the Warfighter receiving mission information anywhere on the battlefield. The JTR System is the essential tactical piece for making these connections whether airborne, on the ground, or at sea, with a continuous on-the-move capability.

(d) Network Saturation. The demand for increasing amounts of data to support future battles will result in many more networks on the battlefield. These networks put extraordinary demands on network management. The desired operational tempo demands that network management for the most part is transparent and not burdensome on the limited bandwidth normally associated with the tactical networks. Therefore, these networks must not rely on personnel-based management but rather be self-organizing and be able to automatically adjust to changing circumstances (e.g., correcting faults, isolating intrusions, battle damage, etc).

(e) Network Backbones. Just as the Defense Information System Network (DISN) performs as the backbone network at the strategic and operational levels, a system that provides a robust RF backbone for mobile forces at the tactical level is critical. These JTR System backbones must provide the connection into the higher level networks and provide the cohesion of the numerous smaller networks (e.g., local area networks) that will be very mobile with organizational structures that may change constantly.

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(f) Future Warfighting Concepts. As mentioned, JV 2020 operational concepts are guiding the future concepts of the services that will dictate how the joint force fights. Highly mobile, more lethal, smaller independent forces that operate in a more de-centralized fashion and are more information dependent generally characterizes future warfare for the U.S. Armed Forces. To execute this style of warfare, the communications infrastructure at the tactical level must be just as mobile and dynamic as the forces. Additionally, the different environmental domains each service operates in and their unique needs drove the JTR System requirements. However, there are common requirements that are shared among the services, and especially within the same domains. By developing a radio system that meets not only the common needs but is flexible and modular enough to meet specific requirements of each service, interoperability and logistical supportability among the services is improved, and synergies are achieved in numerous areas such as acquisition and training. The JTR System is only one communications system of many systems that will enable these Future Warfighting Concepts. In addition to the JTR System providing the warfighter with the critical Command, Control, Communication, Computers Intelligence-Surveillance and Reconnaissance (C4ISR) information needed at the lower tactical echelons (e.g., tactical infosphere(s)) the JTR System will also provide reach data from sustaining bases to the tactical warfighters. It is the aggregate of these many systems that will enable the warfighter the ability to see first, understand first, act first, and finish decisively at the tactical levels of operations. The following describes general characteristics of future joint and service warfare and the communications support needed that results in the requirements found in this document.

1. Flexibility and Agility. Our forces are called upon more and more to rapidly deploy and react to changing missions. For example, a single Joint Task Force (JTF) may be tasked to support humanitarian operations one day and then immediately be tasked to conduct a Non-Combatant Evacuation Operation (NEO) in a hostile environment. This requires a communications system that provides the flexibility that can change its characteristics “on the fly” based on the official mission tasking as outlined in the operations order. This may include immediate changes in cryptographic keying material or waveforms without requiring major hardware reconfigurations. It may also require establishing additional mobile ad hoc networks that are able to tie into dissimilar networks that carry needed information for the new mission. Future communication systems need to provide agility in at least three ways: provide the commander the agility to reconcile dilemmas on the move through information dominance; provides unit agility in such a way that as the unit moves, the unit subnet affiliation with the network is maintained with no apparent loss of capability; and to enable units to reorganize and perform corresponding modification of the network in a manner transparent to the warfighter. Capabilities provided by the JTR System will be required by maneuver, maneuver support, and maneuver sustainment units to meet the operational demands imposed by dispersed, noncontiguous battlespaces and unique force packages. Units not considered frontline in traditional linear battlefield constructs will require expanded and flexible data transport capabilities.

2. Connectivity. The sensor to shooter concept for the future battlefield places a premium on end-to-end connectivity from the node sensing/observing a target to the node that brings to bear ordnance/reconnaissance on that target. In the past, these nodes most likely worked with different radio systems and most often on different frequency spectrums. While these nodes may continue to

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work on different frequency spectrums due to environmental factors, our future warfighting concepts require that the sensing/observing node be able to pass target data directly to the ordnance/reconnaissance node in a way that is transparent to the Warfighter. This requires that the JTR Set be available in extremely small form/fit for integration, for example, into small-unattended sensors. This also demands that the JTR System must operate across the frequency spectrum and act as the connection between the nodes and/or different networks. For example, a ground unit node (e.g., sensor/observer) that is operating on a Very High Frequency (VHF) net must be able to tie into either a Ultra High Frequency (UHF) naval gunfire net or a UHF Tactical Air (TACAIR) close air support net where a reconnaissance/ordnance node will be operating. This is necessary to support our ability to conduct offensive operations and fight outnumbered and win while executing, sustaining, and shaping decisive operations from theater to the lowest tactical level. This basic connectivity needed to prosecute the sensor-to-shooter concept can be provided within the JTR System network or through JTR System inter-connectivity with other networks in the GIG. In some cases, the GIG may not reach to critical areas and special actions are necessary to extend the network. For example, when a field of unmanned ground sensors are deployed in areas that are beyond line-of-sight to the JTR System/equipped warfighter systems, and no other component extends into that area, the JTR System network can be extended through existing infra-structure (wired or wireless) in the area, ground radio relays, aerial relays or through a Satellite Communications (SATCOM) waveform. Connectivity is vital to dynamic operations across all domains and levels of command. Communications connectivity to enable timely and effective information collection, fusion, and dissemination becomes especially critical during operations in areas where forces are scattered in isolated enclaves, and communications options are scant, such as deep attack and reconnaissance, and air assaults.

3. **Equipment.** The employment of smaller, more mobile forces, especially in the ground domain, demands a reduction in equipment where possible. Currently, the Warfighter is forced to carry multiple single channel radios in order to participate simultaneously in multiple voice/data nets. This decreases mobility and flexibility of a small unit. Therefore, the Warfighter must be able to send/receive data and participate in multiple nets using a single terminal, in this case the JTR System. Also, because most Warfighters at the tactical level are disadvantaged users, a premium is placed on bandwidth, requiring maximum use of all available bandwidth and channels. This demands that a node or network is able to sense the traffic load and automatically adjust channel and bandwidth to meet mission requirements.

4. **Operating Areas.** Much larger operating areas containing widely dispersed forces are envisioned in future warfare from hundreds of square kilometers for ground forces to thousands of square miles for the air forces. This, coupled with the dynamic movement and reallocation of forces at the tactical level, requires self-organizing, self-healing networks. The JTR System must be able to hold together these networks as nodes move at the highest speeds and rapidly enter and exit the networks (e.g. aircraft) perhaps at great distances. Also, because of these anticipated large operating areas, satellite and airborne nodes are considered key to extending networks and maintaining network integrity.

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5. **Organizational Identities.** Littoral warfare is a principal warfighting concept for our naval forces. These littoral operations consist of numerous disembarking and re-embarking operations. Once ashore, ground forces must establish their applicable networks, using the same identifiable personal and organizational addresses that were used in the littoral operations. In general, the very mobile and fluid future battlespace will dictate contending with this situation often whether the forces in the battlespace are maritime, ground, or air forces.

6. **Voice vs. Data.** While future operations will still require point-to-point voice communications, the transfer of digital data, imagery, and geospatial information -especially for information that feeds into a common tactical picture--is overtaking voice as the principal medium to communicate mission requirements. Therefore, the JTR System must be flexible enough to provide point-to-point and netted voice and data, whether it is between/among Marine Corps Command Centers, Army Command Centers, Shipboard Command Centers, Air Force Command Centers, Joint Operations Centers or other functional centers (e.g., intelligence, logistics, etc.).

7. **Common Operational Picture/Common Tactical Picture (COP/CTP).** As mentioned, dependency on information will increase in future warfare. A portion of this information deemed critical on the fluid battlefield is an accurate common operational picture or tactical picture. One means of ensuring accuracy is transmitting COP/CTP updates simultaneously to all the applicable warfighters so that a commander can reasonably expect all those within the command to see the same relevant picture linked to mission, task, and purpose. This requires the means to broadcast or multi-cast the required information while maximizing use of the available bandwidth.

8. **Stealth on the Battlefield.** Low observable/stealth platforms are an important element of future battles. This characteristic is at odds with a need to send/receive mission information -an action that can potentially expose a platform. Therefore, the JTR System must provide a passive means to participate in networks without degrading these platforms' low observable/stealth characteristics.

9. **Logistics Tail.** Lighter, faster, and increased mobility in the ground domain demands a reduction in weight and logistic tail. While increased bandwidth is needed to prosecute network centric warfare and support the envisioned services' warfighting concepts, the increased bandwidth must not come at the expense of increased logistics (e.g., accelerated battery consumption). Reduced logistics footprint in the form of fewer antennas and lower weights for new radio systems is also included in this need.

10. **Training.** Emerging information-age technologies will provide powerful new capabilities that will change the way our forces train. Warfighters will use the JTR System as a transport means to accomplish their individual system training. The JTR network will provide a virtual network linkage to support warfighters during live training whether at home station or deployed. The system will support adaptive learning by providing the communications capacity to exploit stored and replayed situational awareness among distributed command elements and platforms. Access to instrumentation

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systems can be provided using the JTR System. The JTR System will support embedded collective training and mission rehearsals through interoperability with standard Service or Joint simulations. JTR System training will have an embedded capability. Information exchange mechanisms used for simulations and stimulations will be JTA compliant.

11. Collaborative Management of Waveforms. The JTR System is more than waveforms and networking. It must accommodate active and passive interfaces by managing what the communication system must support and why. Based on Mission, Enemy, Terrain, Troops and Time Available (METT-T), some waveforms must be relied on to do certain functions. These will be workhorse waveforms for a specific mission task and purpose. JTR System must provide a construct by which radios can be configured for the right active and passive interfaces. Although this radio will be capable of cross banding, the 'user' of the JTR System cannot be the sole means of determining what the most convenient waveform on which to transmit. The JTR System must support maneuvering of information and network management capabilities if these capabilities are to be realized. Bottom line, the JTR System must enable dynamic configurable collaboration actions and interactions to occur.

12. Position Location. The JTR System must be capable of very precise locating of friendly entities in a stand-alone manner. This will be a key alternate means of locating friendly entities if external means for doing this such as Digital Radio Frequency Tag (DRAFT) and Ground Moving Target Indicator (GMTI) radar are not available. The degree of precision is based on the requirement to automatically clear Line Of Sight (LOS), Beyond Line-Of-Sight (BLOS) and Non-Line of Sight (NLOS) fires. Also, we must perform positive airspace control to dynamically task/re-task aerospace assets (UAV, Rotary and Fixed Wing aircraft, etc.), in order to maximize combat power from aerospace, direct, and indirect fires on rapidly emerging/time-sensitive targets.

All requirements in paragraph 4 of this ORD should be viewed in the context of how the JTR System will enable missions, tasks, and purposes such as those highlighted in paragraphs 1-12 above.

(2) Support Concept. Commercial sources and practices to provide the most cost effective support solution will support the JTR System. The JTR System will be supported by the DoD-wide logistics infrastructure where economically advantageous or operationally imperative. The JTR System will be designed initially to accommodate the requirements identified by the Service branches as common to all domains to take advantage of economies present in commercial design practices. As legacy communications systems are retired, the JTR System components will become more abundant. The intended result of this evolving commonality is the gradual DoD-wide reduction in operational, training, maintenance, and manpower requirements. These reductions will increase as the JTR System replaces numerous dissimilar radio sets and their respective training and maintenance infrastructures with standard JTR Sets and support programs.

f. Benefits of Evolutionary Acquisition. Warfighter requirements as well as the technology available to meet them change far more rapidly than traditional acquisition and fielding strategy can

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accommodate. This ORD defines the JTR System and Sets that will be acquired in an evolutionary manner to accommodate the rapid changes. Evolutionary acquisition allows the JTR System and Sets to keep pace with changing commercial technology and to maintain required interoperability with other networks based on Joint Technical Architecture (JTA) and commercial standards. Evolutionary acquisition provides for insertion of new technologies to achieve threshold, objective and emerging requirements to increase capability and functionality for warfighters. The overarching goal is to minimize the time to satisfy requirements while remaining consistent with DoD directives, sound business practices, funding availability and risk mitigation. Evolutionary acquisition provides for multiple procurements with increasing capability and functionality during the life of the program. Pre-planned program improvements will be incorporated into the acquisition process and thoroughly integrated with previous capabilities and functions. Successful evolutionary acquisition that maintains a balance between requirements, cost, schedule, and performance will require concerted cooperative efforts by acquisition strategy committees during requirements, program management and test/evaluation processes.

2. Threat.

a. Threat to be Countered. The JTR System is not designed to counter/combat a specific threat capability. However, information generated and signals transmitted by the JTR System can be used to detect, classify, geo-locate, and/or target friendly forces. Further, the JTR System implementation shall not degrade those waveforms designed to counter INFOSEC threats (such as jamming) associated with specific legacy waveforms.

b. Projected Threat Environment/Threat Reference Documents. In the future operational environment (OE), future adversaries will use adaptive strategies to defeat our networked communications systems. The JTR System components will be exposed to the same physical and NBC threats as the platforms on which they are mounted throughout the DoD. Communications systems and networks are subject to numerous threats including Information Operations (IO) (such as Computer Network Operations (CNO) and Electronic Warfare (EW)), intelligence, surveillance, target acquisition, and physical destruction. System attacks may occur in the form of classic Electronic Warfare (EW) measures such as Electronic Support (intercept or direction finding) or Electronic Attack (EA) (e.g., jamming). Since the JTR System is a computer/software-based, networked communications system, offensive Information Warfare (IW) such as Computer Network Exploitation (CNE) and Computer Network Attacks (CNA) (e.g., cyber attack, hacking and/or malicious code) are feasible. Offensive IW threat mechanisms have been grouped into four categories: 1) Compromise-of-information – when an adversary gains access to friendly information either by making an electronic copy of it or by gaining access to the hosting machine and simply reading it; 2) Data Deception or Corruption – when the data contained in a system or being transmitted over a data or sensor link is modified, whether it is intentional or unintentional; 3) Information Denial or Loss – when access to friendly information is disrupted, it could cause a denial of service, destruction of the bit stream, signal, or database; and 4) Physical Destruction or Damage – when the original state of a system's physical components are altered or destroyed such that they no longer function according to their design. While external threats from potential and actual adversaries pose a significant threat, the most immediate

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vulnerability lies with trusted insiders who are authorized access to our systems and develop software. The migration toward commercial based technology further increases the system vulnerability. Adversaries will attempt to find and attack major points of failure in the network in order to disrupt network operation. Attacks against communications systems and networks can severely impact mission accomplishment by reducing the synergistic effectiveness of Joint warfighting capabilities by adversely affecting tempo, battlefield synchronization and, thus, survivability. For these reasons, the JTR System can be considered a high value target for adversaries. For detailed threat information, refer to the following DIA-validated references: National Air Intelligence Center (NAIC), Automated Information System (AIS) Threat Environment Description (TED), NAIC-1574-0210-00 (S/NF); NAIC, System Threat Assessment Report for Military Satellite Communications, NAIC-1574-0367-00, (S/NF); and Electronic Warfare Threat Environment Description, (U), NAIC-1574-0731-01, (S/NF).

3. Shortcomings of Existing Systems and C4ISR Architecture. Existing tactical military radio communications systems were designed with mutually exclusive architectures to perform a specific task. Many existing systems do not comply with applicable information technology standards contained in the DoD Joint Technical Architecture (JTA). Those standards embrace commercial open architectures and modular designs to deliver multiple communications means and network functions from a single platform. Most current tactical systems:

- a. Operate on a single frequency band, are limited to a single waveform and generally can interoperate only with like radios (mandating multiple radios for weapon platforms and command and control nodes).
- b. Operate at low to medium data rates and have limited routing and networking capabilities.
- c. Have fixed data rates that waste capacity and cannot automatically adjust performance (bandwidth and power) to meet demand.
- d. Are unique, consisting of numerous components and parts that require specialized support requirements that create a logistics burden.
- e. Are not capable of simultaneous voice, video, and data operations in the same or other domains.
- f. Do not employ open systems architecture.
- g. Require extensive depot level equipment or component changes to implement new capabilities in installed platforms.
- h. Do not allow incremental or modular upgrades to increase the choices of waveforms and the bandwidth within those waveforms, or modify message system standards.
- i. Are based on non-modular designs and are not conducive to cost effective improvements and

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modifications dictated by interoperability requirements, as they become known.

- j. Have high recurring integration costs to add new capabilities/functionality to platforms.
- k. Are not capable of simultaneous operation with other systems in the same or other domains.
- l. Do not have adequate frequency flexibility (within a wide range of frequencies) to operate globally, which precludes them from operating completely in compliance with applicable National and International rules and regulations governing the use of the electromagnetic spectrum.
- m. Lack the ability to conduct complex network management and to facilitate inter-service interoperability.
- n. Are incapable of fully supporting high operational tempo because of extensive manual involvement to plan and establish communications links and to reconfigure networks.
- o. Have insufficient performance characteristics in complex, urban, and subterranean environments.
- p. Do not support highly mobile high echelons (e.g., battalion to divisions) and are not optimized for the offense.
- q. Can not support LPI/LPD/LPE techniques necessary to prevent detection and exploitation by an adversary.
- r. Do not adequately support message format translation or gateway and relay functionality.

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4. Capabilities Required. The performance requirements cited in this paragraph are capabilities for the JTR System or as they apply to each JTR Set configuration. Requirements are denoted as Key Performance Parameters (**KPP**), Threshold (**T**), and Objective (**O**). Supplemental capabilities/requirements are further defined in the domain annexes. Annex D identifies the core capabilities that define the integral characteristics each JTR Set shall have. These core capabilities are the minimums necessary to achieve a significant, stand-alone, operationally effective, and suitable military capability such that, should no further development occur within that family/domain, the user will have a significant capability.

ORD KPP Summary

Key Performance Parameter	Threshold	Objective																																				
Have an internal growth capability. (Ref. ORD para. 4a(1)(b))	Open System Architecture IAW JTA; Modular, Scaleable, Flexible Form Factors.	Same as Threshold.																																				
JTR Set modes/capabilities configuration and reconfiguration via software. (Ref. ORD para. 4a(1)(c))	By operators in their operational environment.	Same as Threshold.																																				
Multi-channel routing and retransmission. (Ref. ORD para. 4a(1)(e) and Table 4-2)	KPP waveforms that are same in mode (voice, data, or video) and use like data rates and operate at permissible security classification levels.	Objective waveforms that are same in mode (voice, data, or video) and use like data rates and operate at permissible security classification levels.																																				
Support waveforms. (Ref. ORD para. 4a (1) (f) and Domain Requirements Blocking (Annexes A through C).)	See Domain Requirements Blocking (Annexes A through C).	See Domain Requirements Blocking (Annexes A through C).																																				
To operate on designated number of channels at the same time. (Ref. ORD para 4a(1)(h); Annex A, para. 4a(1)(e); Annex B, para 4a(1)(a); and Annex C, para. 4d(3)) All JTR Sets will include GPS except for some Small Form Fit sets.	<table><tr><th>Channel</th><th>Set</th></tr><tr><td>1</td><td>Small Form Fit Block 1</td></tr><tr><td>2</td><td>Small Form Fit Block 2</td></tr><tr><td>1</td><td>Hand-Held Block 1</td></tr><tr><td>2</td><td>Hand-Held Block 2</td></tr><tr><td>2</td><td>Man Pack</td></tr><tr><td>6</td><td>Vehicular</td></tr><tr><td>8</td><td>Airborne</td></tr><tr><td>4</td><td>Maritime/Fixed</td></tr></table>	Channel	Set	1	Small Form Fit Block 1	2	Small Form Fit Block 2	1	Hand-Held Block 1	2	Hand-Held Block 2	2	Man Pack	6	Vehicular	8	Airborne	4	Maritime/Fixed	<table><tr><th>Channel</th><th>Set</th></tr><tr><td>1</td><td>Small Form Fit Block 1</td></tr><tr><td>3</td><td>Small Form Fit Block 2</td></tr><tr><td>1</td><td>Hand-Held Block 1</td></tr><tr><td>3</td><td>Hand-Held Block 2</td></tr><tr><td>4</td><td>Man Pack</td></tr><tr><td>8</td><td>Vehicular</td></tr><tr><td>10</td><td>Airborne</td></tr><tr><td>10</td><td>Maritime/Fixed</td></tr></table>	Channel	Set	1	Small Form Fit Block 1	3	Small Form Fit Block 2	1	Hand-Held Block 1	3	Hand-Held Block 2	4	Man Pack	8	Vehicular	10	Airborne	10	Maritime/Fixed
Channel	Set																																					
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3	Hand-Held Block 2																																					
4	Man Pack																																					
8	Vehicular																																					
10	Airborne																																					
10	Maritime/Fixed																																					
Scaleable networking services. (Ref. ORD para. 4a(3)(a))	Ground and Airborne Domains.	Maritime/Fixed Domain.																																				
Network extension/coverage. (Ref. ORD para. 4a(3)(b))	Across organizational boundaries.	Same as Threshold.																																				
JTR System network interoperability. (Ref. ORD para. 4.a.(1)(r) and Appendix E (IERs))	Interoperate with Service and Joint networks; satisfy 100% of critical top-level IERs.	Interoperate with Allied/Coalition and commercial networks; satisfy 100% of top-level IERs.																																				
Operational Availability A(o) (Ref. ORD para 4.c.(1))	0.96 (Channel)	0.99 (Channel)																																				

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TABLE 4-1

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a. System Performance. The JTR System shall meet the following performance parameters:

(1) General Performance:

(a) The JTR System shall be capable of supporting secure and non-secure voice, video, and data communications using narrowband and wideband waveforms. Where a JTR Set replaces the waveform/radio function(s) of one or more legacy radios and continued interoperability with legacy radios is required, software waveforms will be developed and the JTR Set shall perform the same waveform/radio function(s) and mission(s) supported by the legacy radio(s). **(T)**

RATIONALE: The JTR System users operating across the operational continuum must be able to communicate with organizations that employ radio systems with a wide variety of waveforms and technological maturity. Table 4-2 identifies waveforms for JTR Sets and identifies critical waveforms as KPPs. In JTR System usage, the term waveform is used to describe the entire set of radio functions that occur from the user input to the RF output and vice versa. The JTR System will receive, gateway, and transmit information.

^{*}(b) The JTR System shall provide an internal growth capability through an open systems architecture approach in compliance with the Joint Technical Architecture, and shall be modular, scaleable, and flexible in form factor. **(T) (KPP)**

RATIONALE: Open systems architecture (interfaces, buses, software, protocols, etc.) facilitates interoperability with other services, the sustaining base, and commercial networks and will minimize the operational impact of upgrading hardware and software components. The internal growth capability will provide for an increased capability or functionality of each set and with each generation of radios. Modular design will provide the capability to keep pace with technology growth and provide the warfighter with the ability to deploy a force with state-of-the-art technologies. For example, adopting a newly developed waveform that operates above or below the 2MHz-2GHz range into the JTR System could be as simple as adding or substituting hardware modules (card, antenna, etc., if necessary to support the frequency range), then loading the new waveform software module into the JTR System hardware suites. This capability will support upgrades to hardware and software in the operational environment without need to evacuate the JTR Sets or extensive delays that impact operational availability of the JTR Sets. Scaleable software and internal physical characteristics will provide the capability to meet a variety of mission requirements. For example, as adjustments to operational missions are known (e.g. task re-organization, extension of operating area, local restrictions, etc.) the functionalities of the JTR System can be quickly and efficiently adjusted to support the operational tempo needed. Procedures to configure and re-configure the JTR System must be sufficiently agile to keep pace with the warfighters' need to plan and disseminate information in a timely manner to support the next operation and simultaneously to disseminate information to the right place at the right time to support current operations. The flexibility of form factor relates to the ability of a set to

^{*} Key Performance Parameter

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be adapted into configurations for integration into the various platforms. This requirement has enormous potential for cost avoidance in terms of reusing hardware and software modules, commonality of spare parts, and commonality of training. An example would be the integration of a (new) software function/operation that replaces a hardware component.

^{*}(c) Each JTR Set shall provide any designated operator with the ability to load and reconfigure its modes/capabilities via software while in the operational environment. **(T) (KPP)**

RATIONALE: Software configuration and reconfiguration of sets by the operator facilitates rapid re-configuration of the radio set to meet varying mission needs. This capability, when the JTR Set is configured with necessary ancillary hardware devices, enables interoperability by making it possible for the operator to configure the radio set in the field, when needed, to operate in multiple bands and modes. It also eliminates the need for a technician to travel to the set, transport the set to a maintenance facility, or proliferation of specialized personnel to perform the functions.

(d) Each JTR Set shall have the ability to be reconfigured (hardware, software and firmware changes/upgrades) in the operational environment **(T)** by the operator. **(O)**

RATIONALE: Hardware, firmware, and software configuration and reconfiguration in the operational environment reduces the need to evacuate components or platforms. The objective for operators to configure/reconfigure hardware, software and firmware to meet changing mission needs is intended to reduce requirements for technicians to perform these tasks.

^{*}(e) JTR Sets configured for multi-channel operation using single or multiple waveforms and networks shall be programmable to automatically route and retransmit information between and among its configured networks that use the same communications mode at like data rates and at permissible security classification exchange levels for Key Performance Parameter waveforms **(T) (KPP)**, for other Threshold waveforms **(T)**, and for Objective waveforms. **(O)**

RATIONALE: This requirement provides the warfighter with the capability to program the JTR Set to link like-mode operational networks together. This capability is exercised when required by the mission (in the context of “Interoperability Categories”) or when they lack either effective direct propagation, or Category 1 “Same Radio” or Category 2 “Common Waveform” direct interoperability. Utilizing the installed and configured operating waveforms of the JTR Set the Category 3 “Gateway & Relay” capability enables automatic indirect interoperability between the system/networks that use the same communications mode (i.e. voice, or video, or data) to route and retransmit information. This capability provides the relay, gateway, and/or bridge between dispersed and/or legacy networks (E.g., this allows a user to receive on UHF FM and send traffic/messages out in a SINCGARS network.). As operationally required, the JTR Sets configured to simultaneously operate multiple channels using a

^{*} Key Performance Parameter

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single mode will serve to link networks together into a single inter-network for information transport between systems.

* (f) The JTR Sets collectively shall support specified KPP waveforms (**KPP**); waveforms designated Threshold (**T**); and waveforms designated as Objective (**O**) as noted in Domain Requirements Blocking (Annexes A through C).

RATIONALE: KPP waveforms include legacy waveforms (SINGARS, HAVE QUICK, UHF DAMA/DASA SATCOM, LINK 16, and EPLRS) and a new waveform (Wideband Networking). To support missions currently supported by legacy radios and to meet critical operational requirements during transition from legacy radio systems to the JTR System, the JTR System must be capable of interoperability with legacy networks. The Wideband Networking Waveform (WNW) shall provide dynamic, mobile networking and is required to meet the demand for a high data rate network capable waveform to support command and control on-the-move (C2OTM) information transport. This collective (group) requirement for JTR Sets is not intended to apply equally to all configurations of JTR Sets. The performance demanded of an individual JTR Set is subject to the hardware and software configuration selected to meet specific platform requirements. One example is where a HW/SW suite that constitutes a JTR Set is configured to meet a specific vehicular host platform requirement for three channels: WNW, SINGARS, and EPLRS. That JTR Set is not required to operate more than four channels nor meet the performance of other waveforms without HW and/or SW reconfiguration that accommodates the added channel(s) and/or waveform(s). Another example is a handheld JTR Set that is configured to meet a specific user requirement for one channel: SINGARS. That JTR Set is not required to operate two channels nor another waveform without reconfiguration.

(g) The JTR System shall be capable of operation within the 2 MHz to 2 GHz radio frequency spectrum as specified in Table 4-2 (**T**) and incorporating military and commercial satellite and terrestrial communications above 2 GHz and below 2 MHz. (**O**)

RATIONALE: The threshold waveforms that the JTR System will emulate operate within the frequency range of 2MHz to 2GHz. Objective radios will operate below and above these limits (e.g., future wireless local area networking (WLAN), CHARIOT, MIDAS (Mini Data Acquisition System), Tactical Common Data Link (TCDL), Guardrail Common Sensor (GRCS), Tactical Exploitation System (TES), Modular Interoperable Surface Terminal (MIST), etc.).

* (h) Each multichannel JTR Set shall be capable of operating on multiple full or half-duplex channels at the same time as detailed in Table 4-1. (**T**) (**KPP**).

RATIONALE: This capability will allow multiple communications functions on different frequencies at the same time. One example is receiving a video feed from a combat camera team on channel 1; receiving data via e-mail on channel 2, and having voice conversation on channel 3. This capability for simultaneous multiple functions is required for efficiency and interoperability on today's

* Key Performance Parameter

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fast-paced battlefield. Waveforms that operate in full-duplex mode will be permitted to use the radio resources for simplex and/or half-duplex waveforms in order to provide this full-duplex capability (i.e. two JTR channels, one for transmit and one for receive, and potentially their separate antennas). Reference Annex A, para. 4a(1)(e); Annex B, para 4a (1)(a); and Annex C, para. 4d(3). This requirement is subject to the hardware and software configuration selected to meet specific user requirements. For example, a handheld JTR Set that is configured to meet a specific user requirement for one SINCGARS channel is not required to operate two channels nor another waveform without reconfiguration of the HW and/or SW suite that constitutes the JTR Set.

(i) Each JTR Set configured for multi-channel operations shall have the capabilities of automatic transmission protocol conversion and as defined by the user, message format translation of voice, video, or data, within like modes, between frequency bands or waveforms for which it is configured. (T)

RATIONALE: Protocol conversion and message format translation will bridge information flow between systems that use dissimilar protocols and formats. Initially, this function may reside on the JTR Set's host platform/system and be spirally implemented with the JTR Set. The scope of MFT shall be based on operational requirements and the capability to translate dissimilar formats within DoD and NATO. Protocol conversion and message format translation between modes (e.g., voice to data) is not implied in this requirement.

(j) Without interfering with, or overriding the JTR Set operations, the JTR System shall be capable of distributing and accepting software and firmware upgrades and changes. They shall have both assured data integrity and assured authentication, and may be transferred over any available network media with which the set interfaces. A means to alert the operator and network manager that an over-the-air or other remotely transferred event has occurred is to be provided, including any need for user acknowledgement and/or manual confirmation and/or activation. (T)

RATIONALE: This requirement will allow JTR Sets to be operationally available and reliable during transfer and/or implementation of software and firmware upgrade operations to prevent impact to essential mission performance. Assured authentication and assured data integrity are required to ensure that upgrade data is unchanged from its source and has not been accidentally or maliciously modified, altered or destroyed. Multiple transfer media provides upgrade system reliability through redundancy and flexibility. It is also critical to provide a selection of implementation initiation options, to prevent potential "disasters" during missions. Actual implementation of the upgrades shall be selectable by the operator and/or network manager, including but not limited to, instant, delay, upon next boot or startup, and upon local user confirmation.

(k) Within its configured JTR channels, each JTR Set shall provide the ability to scan a minimum of 10 operator and/or network manager designated fixed frequencies and/or presets per channel (T), and individual frequency bands. (O)

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RATIONALE: In operational situations, as required, the JTR Set operator can monitor several frequencies for activity without interfering with communication, thus eliminating the need for full-time use of resources for constant monitoring of the several frequencies. Special Restriction – This scanning capability may be employed in addition to the simultaneous “guard” receiver functionality required to be imbedded in certain designated waveforms, such as VHF and UHF air traffic control, but it shall not be substituted for it.

(l) Each JTR Set shall include/provide interfaces to user owned ancillary equipment to minimize platform integration impact, or provide the ancillary equipment where compatibility/interfaces cannot be achieved. **(T)**

RATIONALE: The JTR System will provide the connectors/cables and other peripheral equipment necessary to integrate JTR Sets into user platforms. Where radios replace existing radios, existing ancillary equipment (installation kits, controls/displays, power amplifiers, power supplies, masts, antenna couplers, antennas, etc.) will be used to the extent possible. If the JTR Set is found incompatible with existing user peripheral equipment, the JTR System is to provide the peripheral equipment. If a non-standard interface is required, the JTR System shall accommodate the interface in the most effective way as determined by technical and cost analyses.

(m) After an unexpected power loss, or operator controlled shut down, and upon restoration of power to the radio set(s), each JTR Set shall be capable of completing a components diagnostics test and a systems recovery. This shall include, but not be limited to, tests of hardware, firmware, software, presets, operational modes, and settings. **(T)** and the set should provide “instant on” activation to the “recalled” or last used configuration, including the ability to rapidly make any necessary changes. **(O)**

RATIONALE: Loss of primary power to radio sets is a common occurrence, and recovery of JTR Sets to operating state after power loss will support critical continuity of operations. After restoration of power, the user/operator of a JTR Set must be able to restore the Set to full operation (restores back to last radio configuration/parameters/operational settings prior to power interruption) without need for equipment or procedures external to the JTR Set.

(n) The JTR Set shall provide software and standard hardware interface(s), necessary to exchange voice, video, and data with service host/platform systems. **(T)**

RATIONALE: A JTR Set installed in a weapon system, common platform, or in a dismounted mode will utilize standard interface points to simplify current and future integration of the systems. For example, Ethernet, tactical 4-wire, and RS-232 are standard interface points. Any or all could be required depending on the system with which the JTR Set must interface.

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(o) In addition to channels and waveforms required, each JTR Set shall be capable of receiving Global Positioning Satellite (GPS) signals for both military (encrypted) and commercial (not encrypted) applications as permitted by policy. **(T)**

RATIONALE: Encrypted GPS allows denial of GPS services to unauthorized elements. In cases where GPS encryption is not practical, such as interoperation with civil systems, operators may elect to operate without encryption in order to maintain commonality. (Having this option does not imply that commercial GPS would be used in violation of national and/or DoD policy). All military GPS capabilities developed and procured after 1 October 2002 will include the Selective Availability Anti-Spoofing Module (SAASM).

(p) Each JTR Set shall provide means to exercise an option to employ an external position location system and its data (e.g., location, timing, etc.) in lieu of use of the JTR Set GPS. In addition, each JTR Set shall provide a means to provide GPS data (e.g., location, timing, etc.) to external systems. **(T)**

RATIONALE: These capabilities will allow operators to utilize host systems for position location and timing where advantageous, or use of the JTR Set GPS when host GPS is unavailable for use. It will also allow operators and/or platforms to utilize JTR Set GPS for external purposes or to support both systems as needed, in lieu of dedicated GPS.

(q) Each JTR Set shall have the ability to support the core set of capabilities identified in Annex D. **(T)**

RATIONALE: Annex D identifies the minimal performance common to all JTR Sets.

* (r) The JTR System shall interoperate with service specific and joint networks to the point achievable in legacy networks to satisfy 100% of top-level IERs designated critical (Appendix E) **(T) (KPP)**, and 100% of top-level IERs with Service, Joint, Allied/Coalition and commercial networks as applicable to missions. **(O)**

RATIONALE: In the context of this ORD, interoperation involves two or more otherwise non-interoperable operating entities linked together with a common thread to allow communications to occur. User-to-user Information Exchange Requirements (IERs) identify the need for users to "talk" but are neutral as to the means i.e. how the transactions are accomplished. Although this ORD does not directly describe user IERs, the overarching intent of the JTR System is to provide the means to enable users to exchange information.

Many legacy radio systems interoperate successfully using Interoperability Category 1 – Same Radio such as SINCGARS to SINCGARS but only within their closed (thus “stovepipe”) networks. When an operational mission expands to require inclusion of the JTR System equipped forces, the JTR

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Set will enable interoperation by utilizing Category 2 – Common Waveform (SINCGARS) with the legacy radios and when the mission expands further to require inclusion of another wholly non-interoperable legacy system, such as HAVEQUICK, multi-channel JTR Sets will enable additional interoperability by using Category 3 – Gateway & Relay to provide the necessary conversions and bilateral retransmission between the SINCGARS and HAVEQUICK networks. Therefore, the JTR System provides the ability to transform multiple, non-interoperable, legacy networks into a highly interoperable system of networks.

Multi-channel JTR Sets are required to provide automatic routing and retransmission between like-mode waveforms. In this way, inter-operation between legacy nets will be achieved for those waveforms emulated by JTR Sets.

The inter-network thus formed by the JTR System must also interoperate with other Service-specific and Joint networks that do not use the waveforms emulated by the JTR System. This provides means for extending the JTR System connectivity into the other networks and provides links for overall coordination and management of tactical and other communications architectures deployed to areas of operation. The Joint Information Exchange Requirements at Appendix E support the need for interoperability between the JTR System inter-network and other systems/networks. The objective requirement recognizes the future need to expand inter-operability to commercial and allied/coalition networks.

(s) Each JTR Set shall operate at full performance levels and not degrade mission effectiveness of host systems/platforms engaged in their operational environments, including movement and weapons firing. (T)

RATIONALE: JTR Sets serve host systems/platforms in various ways in order to support the platforms missions. This requirement will ensure that the JTR System design does not detract from the accomplishment of the mission.

(2) Security Performance:

(a) The JTR System shall provide a scaleable, embedded programmable cryptographic capability, which will support red and black key entry and perform benign technique operations (e.g., benign fill). (T)

RATIONALE: The JTR System will consist of a variety of sets that will interface with various radio networks and cryptographic systems while providing appropriate INFOSEC for protecting data between JTR Sets or up to a legacy end cryptographic unit fronting a host. Scaleable cryptographic software programmability embedded in each JTR Set eliminates the need for external cryptographic hardware assets to support each set, and simplifies software reconfiguration of the set in the operational environment.

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(b) Each JTR Set channel that is capable of processing classified information shall provide for Multiple Single Levels of Security (MSLS) to support encrypted and unencrypted information from unclassified to Secret Level and shall provide capability to operate in a standalone, Top Secret/Sensitive Compartmented Information (TS/SCI) system-high level configuration. In the TS/SCI configuration the JTR Set shall preclude concurrent operation of any channels below TS/SCI classification level (T) and Multi Level Security (MLS) to support encrypted and unencrypted information from unclassified to Top Secret/Sensitive Compartmented Information (TS/SCI) level. (O)

RATIONALE: Military services support both tactical and non-tactical missions. Communication security policies require classified and unclassified information to be transmitted only by secure means to support tactical operations. Tactical military missions require the application of various levels of security to provide the levels of protection for the majority of users (Secret and below) and for Top Secret users. When the JTR Set is configured for TS/SCI operation it will comply with requirements outlined in the Director for Central Intelligence Directive (DCID) 6/3, Protecting SCI within Information Systems, and DCID 1/21, Manual for Physical Security Standards for Sensitive Compartmented Information Facilities (SCIF). Non-tactical missions involving information exchanges between civilian agencies will require the use of unencrypted information. As with all waveforms, the users requiring the use of a single, dual, or combination of MSLS capability must be determined. The security safeguards applied to unclassified information during transmission will be consistent with the need for protection against disclosure, loss, misuse, alternation, destruction, or non-availability.

(c) The JTR System shall provide transmission security capabilities equal to or greater than the radios that the JTR Sets emulate (T) and to specifications for radios/waveforms that may be incorporated into JTR Systems in the future. (O)

RATIONALE: Transmission security will deny unauthorized access to information while being transported over JTR System media. JTR Sets will require the functionality of certain legacy equipment for backwards compatibility as well as new security measures required to protect new waveforms from exploitation.

(d) The JTR System shall be interoperable and compliant with the Electronic Key Management System (EKMS). (T)

RATIONALE: The National Security Agency's approved EKMS is the certified method for key management of DoD systems.

(e) Employing over-the-air, network and local loader connectivity, the JTR System shall be capable of distributing and accepting rekeying and key transfers as implemented by the Key Management Authority, with both assured data integrity and authentication. The JTR Set shall be capable of accepting these transfers or remote actions without interfering with ongoing JTR Set operations. A means to alert the operator and network manager that an over-the-air or remotely

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initiated transaction has occurred is to be provided, including any requirement for user action. Execution of a keying event shall be selectable by authorized users and network managers. **(T)**

RATIONALE: The JTR System will serve thousands of nodes in various applications and operational environments. Multiple means and paths to reliably and securely key and rekey JTR Sets, including local loader, remote, networked, and over-the-air will provide effective and efficient maintenance of network security.

(f) The JTR System shall enable remote identification/authentication and exclusion/inclusion of JTR Sets from network operation. **(T)**

RATIONALE: Having the means for network managers to identify and authenticate, and as necessary exclude (lockout) or include (accept), individual JTR Sets within network operations is critical to maintaining both network security and effective operation during dynamic tactical missions. It also enables exclusion (and if necessary zeroization) of suspect of captured radios, while enabling rapid reassignment and retasking of tactical units.

(g) After a primary power loss, each JTR Set shall be capable of retaining perishable cryptographic variables for at least 96 hours **(T)** and 144 hours. **(O)**

RATIONALE: Retention of cryptographic variables eliminates the need to physically re-load variables after loss of power. The 96 hours cryptographic variable retention requirement supports deploying forces (i.e. SBCT, Special Ops Forces, etc.).

(h) Each JTR Set security module shall be capable of detecting an unexpected degradation of power and placing itself in a known secure state. **(T)**

RATIONALE: Power degradation could cause a JTR Set to operate insecurely. The JTR Set should recognize such under voltage situations and cause automated corrective action. NSA security requirements call for a low voltage detector in the radio design that will effect radio zeroization upon reaching the voltage threshold.

(i) The JTR Sets shall be capable of implementing National Security Agency (NSA) and/or National Institute of Standards and Technology (NIST) approved public key cryptography **(T)**.

RATIONALE: This requirement recognizes emerging trends in technology and the desire to incorporate public cryptography in order to standardize and simplify cryptographic services to provide confidentiality, identification and authentication, access control, digital signature validation, and data integrity.

(j) The JTR System shall interface with and support functions of cryptographic systems/equipment listed at Appendix D. **(T)**

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RATIONALE: The JTR System will emulate the radios that use cryptographic systems at ORD Appendix D. As required, the cryptographic systems components/functionality will be acquired to support waveforms/communications capabilities.

(k) Each JTR Set that is capable of processing classified information shall be handled as an unclassified Controlled Cryptographic Item (CCI) when the embedded device that provides security does not contain RED keys or classified data “(is zeroized)”. If the implementation approach provides a method to readily remove or separate the Controlled Cryptographic Item from the remaining components of the JTR Set, those remaining components may be handled as unclassified non-CCI material. (T) When zeroized, each JTR Set shall be capable of being handled as unclassified non-CCI material by employing technology approved by NSA which minimizes or eliminates risk of exploitation of the embedded device that provides security (O).

RATIONALE: This requirement eliminates need for special physical security measures to protect unkeyed JTR System components. When the JTR Set is keyed, it must be handled at the highest classification level of the key. When it is not keyed (zeroized), it is treated as unclassified CCI. As technology advances, implementation and protection features may be proposed for approval, which could provide a means to consider the entire JTR Set as unclassified non-CCI when not keyed (zeroized).

(l) Each JTR Set shall feature a capability that requires two discrete actions by the operator to manually invoke JTR Set zeroization. (T)

RATIONALE: Two actions will reduce the probability of accidental zeroizing. After the key in a set is zeroed, the set requires a manual re-keying in order to restore the key. Accidental loss of the key would detract from mission effectiveness. An example is a procedure that requires the operator to lift a cover, flip a switch, depress a switch, or a two screen zeroization process such as an action screen and a second pop up screen for confirmation of action screen.

(m) The JTR Set shall provide the capability for authorized users and network managers to locally or remotely zeroize all channels and keys in the JTR Set and to selectively zeroize individual channels and keys. (T)

RATIONALE: Situation will dictate the need to employ this capability (e.g., compromise of the set, channel, or key).

(n) Each JTR Set shall feature a tamper detection and zeroization capability which is in operation when the radio is delivered and can only be disabled for authorized maintenance via a design feature/process approved by NSA. (T)

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RATIONALE: The tamper detection feature built into the JTR Set would recognize any attempt by unauthorized personnel to remove panels or gain access to sensitive component of the JTR Set. Tamper detection would enable zeroization of that radio set. NSA will provide guidance and approval of any disablement feature for the tamper detection capability for the purpose of approved maintenance or other access to the radio internals.

(o) The JTR System shall employ the Defense Information Infrastructure/Common Operating Environment (DII/COE) Key Management Infrastructure (KMI). **(T)**

RATIONALE: The DII/COE is mandated by DoD and will support JTR System integrity, identification, and authentication requirements. NSA will coordinate pertinent elements affecting the KMI.

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(3) Network Performance:

* (a) The JTR System shall be capable of providing scaleable networking services for connected RF (over the air) networks, host networks, and hybrid networks for Ground and Airborne Domains **(T) (KPP)** and Maritime/Fixed Domain. **(O)**

RATIONALE: The JTR System networking services are required to support interoperability between otherwise non-interoperable networks/systems. Networking services provide functions to perform data routing, bridging, switching, link layer message processing, including multimedia processing, network management, and gateway services. Scaleable services (graduated levels of service or capabilities to fit users' needs) are required to provide flexibility for Service-specific, platform, and form-factor needs.

* (b) The networked JTR System shall extend between and across organizational boundaries within the area of operations. **(T) (KPP)**

RATIONALE: This capability is required to support seamless interoperability across the domains and ensure operational effectiveness. The capability extends the JTR System network to all forces in an operational area regardless of artificial boundaries.

(c) The networked JTR System shall provide a scaleable and interoperable means to establish point-to-point (two-way), multi-point (two-way), multicast (up to 100 selected nodes or more), and broadcast data capability between/among any user-selected nodes in a joint network. **(T)**

RATIONALE: The need for data transport capability and capacity varies with different types of users. Scaling data transport services conserves network resources and increases availability of resources for use where operationally needed. Multi-cast to 100 selected user nodes supports timely transport of priority data such as NBC reports within a Joint Task Force (JTF).

(d) The networked JTR System shall provide for mobile JTR Sets to readily transition between authorized networks and be transparent to the user. **(T)**

RATIONALE: Seamless and transparent network connectivity on a fluid battlefield will enable mobile users to automatically affiliate, de-affiliate and re-affiliate with networks in order to exchange critical data during operations.

(e) The networked JTR System shall provide routing capability, interface connectivity that extends into the US military, civilian and cellular radio networks as enabled by the waveforms listed in Table 4-2. **(T)**

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RATIONALE: This requirement enables the JTR System inter-network operation.

(f) The networked JTR System shall perform dynamic intra-network and inter-network routing for data transport. **(T)**

RATIONALE: Dynamic routing supports continuity of service to mobile subscribers as they change locations and network connectivity.

(g) The networked JTR System shall include hardware and software sufficient to organize, manage, and dynamically control network connectivity structures, routing mechanisms, and bandwidth allocations. **(T)**

RATIONALE: The JTR System will provide the interchange points (Interoperability Category 3 – Gateway & Relay) between networks that will make up the inter-network of current systems. The resources of the over-arching inter-network thus formed will be managed and controlled by the JTR System in concert with Service and Joint network management systems. This requirement for hardware and software to manage the JTR System inter-network does not imply control of systems or assets that are sub-sets of the JTR System network. For example, control of an EPLRS network is a function of the EPLRS network control. Likewise, control of a SINCGARS data net remains within the SINCGARS net. Thus for example the JTR System will provide the means to dynamically link EPLRS and SINCGARS data nets.

(h) The networked JTR System shall provide the capability to designate any JTR Set to automatically, as well as when queried, to transmit individual location information in the Military Grid Reference System and latitude and longitude formats to selected host systems. **(T)**

RATIONALE: To support various operational situations, Command and Control (C2) hosts connected to JTR Sets need the capability to control position reporting on an ad hoc basis. The JTR System network is the connectivity that supports position reporting between host systems must be flexible to accommodate the host mission. The GPS function in JTR Sets provides own position location. Host command and control (C2) elements designate from one to many JTR Set nodes to report and control reporting parameters such as frequency of reports, receiving nodes, etc. The location of JTR Sets may be displayed on Joint Force Tracking application systems.

(i) The JTR System network shall, at minimum, maintain the same information flow rates of the waveforms/capabilities it emulates **(T)**, and provide increased information flow through the addition of new waveforms and/or protocols. **(O)**

RATIONALE: The waveforms and rates listed at ORD Table 4-2 and Annex E are the complete list of current systems that the JTR System will emulate. Individual JTR Sets will emulate selected current radios from that list. As the interchange points for forming an inter-network of current systems, JTR Sets will operate with the same capacity of the waveforms emulated. The objective

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requirement recognizes the desire to provide increased information flow across the JTR System networks.

(j) The JTR System network shall support a name-to-address translation service that facilitates automatic registration and de-registration of host names and addresses. (T)

RATIONALE: This service enables user host systems supported by the JTR System network to be automatically affiliated and re-affiliated by name to an inter-network address that matches the current location of the host. This requirement supports user mobility in a tactical environment. One implication of this requirement is that a restricted access file for this function will need to exist in the JTR Set and the radio will have to control access via identification and authentication techniques.

(k) The JTR System network shall support the capability for users to address data to other users by using position/organization names in the address fields (e.g., S3.2AR.BDE). (T)

RATIONALE: This feature will enable users to send messages without the need for extensive "call sign" procedures. For example, a user enters a plain-language designation (e.g. Commander, First Battalion, Tenth Infantry) and the JTR System will automatically assign an address based on current connectivity of the addressee. Refer to MIL-STD-188-141B, including multiple self-addresses.

(l) The JTR System shall provide the means to support message delivery based on geographic area. (O)

RATIONALE: This objective requirement recognizes that technology may eventually support the desire to submit messages to an address that includes all connected network members located in a geographic area. For example, this JTR System network service would, given a message (e.g. an NBC warning) and a geographic area submitted by the sender automatically address and transport the message to the connected users located in the defined area.

(m) The JTR System shall provide capability to respond to changes in mission or organization, and reconfigure a network of approximately 150 JTR Sets within 15 minutes (T), and 5 minutes. (O)

RATIONALE: See glossary for definition of network management. Network configuration and re-configuration is currently a time and labor-intensive task. Automated and tailored procedures to reconfigure networks will enhance effective and efficient satisfaction of time-critical operational needs of JTR System users. This requirement will allow network managers to respond to a deliberate network reconfiguration of the networked waveforms to support real time operational mission requirements. (e.g., changes in Unit Tasking Order) This network management capability is envisioned to be scaleable.

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(n) The JTR System will have the capability to maintain a viable Internet Protocol (IP) network infrastructure comprised of geographically dispersed network elements by using LOS, NLOS, and BLOS communications transport capabilities as required. (T)

RATIONALE: IP communications are inherently asymmetric. Legacy networks rely on this capability resident in legacy UHF transceivers, and this capability will be required into the foreseeable future.

(4) Network Management:

(a) The JTR System management tools shall interoperate with Service and Joint Network Management System (JNMS) tool(s). (T)

RATIONALE: JTR System network management is a sub-set of the higher order management provided by the service-specific and joint network management systems.

(b) The JTR System shall allow network managers to remotely identify and configure user access and profile parameters to prioritize users, network access and message delivery. (T)

RATIONALE: The JTR System management will interface with and complement the service and Joint network management tools for overall status reporting (e.g., link, component).

(c) The JTR System network management shall monitor the status of the JTR Sets by acquiring and displaying radio performance data. It shall monitor network condition, report changes in status, and respond to evolving network changes. The information shall be accurate 99% (T) and 99.9% (O) of the time.

RATIONALE: This capability will enable network managers the ability to make decisions on the network based on information provided and if there are problems, rapid corrective actions can be taken.

(5) Spectrum Management:

(a) The JTR System management tools shall interoperate with Service and Joint spectrum management tool(s) including those used to manage the legacy waveforms listed in this ORD. (T)

RATIONALE: JTR System spectrum management needs to be interoperable with service-specific and joint spectrum management systems in order to operate seamlessly within service and joint networks and to provide an interoperable system.

(b) The JTR System management tools shall encompass the functionality to manage

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the allocated spectrum and waveforms listed in this ORD that have been approved by a cognizant authority. **(T)**

RATIONALE: The JTR System will require a spectrum management tool that determines frequency resource requirements, requests frequency resources, and deconflicts allotted resources for JTR System networks. The management tool will need the capability to change frequencies used by the legacy, WNW, and other to be developed waveforms so that they are electromagnetically compatible with the changing topologies of the networks within which the JTR Set operates. In addition, the tool must have a capability to manage waveforms in such a way that will facilitate host nation and FCC/NTIA approval prior to instantiation and use.

(c) Each JTR Set shall have the capability to instantiate waveforms that automatically select operating parameters, including frequency, from the network manager's approved frequency control information for the active AOR. **(T)**

RATIONALE: This capability does not apply to JTR System supported legacy waveforms currently not having this capability and it does apply to new waveforms being developed under the JTR System program (e.g., Wideband Networking Waveforms). This capability enables the JTR Set to automatically select approved RF parameters that maximize frequency reuse, minimize interference, and enhance agility in dynamic frequency assignment environment.

(d) The JTR System management tool shall have the capability to deconflict and modify the frequencies used by the WNW and legacy waveforms within the JTR System. The JTR System shall dynamically accept these changes over-the-air, over data bus and from fill devices. **(T)**

RATIONALE: Spectrum management information must be deliverable through the GIG to appropriate network and system management levels and JTR Systems during all phases of operations from pre-deployment to re-deployment. Each JTR Set must be able to accept spectrum management information electronically and invoke the updates.

b. Information Exchange Requirements (IERs). Joint IERs that the JTR System will support are provided at Appendix E.

c. Logistics and Readiness. The JTR System shall have the following mission-capable requirements for both wartime and peacetime.

^{*}(1) Each channel of the JTR Set shall demonstrate an operational availability A(o) of 0.96. **(T)**
(KPP) and 0.99 **(O)**.

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RATIONALE: The channel A(o) specified supports the readiness of those systems that each particular channel emulates and serves. Additionally the A(o) ensures that maintenance manpower is minimized and that the JTR System logistics system is not overburdened.

(2) The JTR Set hardware size and weight shall be compatible with specifications in the domain annexes. **(T)**

RATIONALE: The JTR Set hardware will conform to space and weight constraints of host platforms as applicable to radios the JTR Set will replace.

(3) The JTR System shall be logistically supportable within each service. **(T)**

RATIONALE: The JTR System will conform to the existing logistics support strategy of the Services.

(4) The JTR Set internal test and diagnostic Built-In-Test (BIT) provisions shall be capable of fault isolation to the line replaceable unit (LRU). **(T)**

RATIONALE: Fault isolation to LRU by BIT simplifies troubleshooting and leads to reduced need for technical training.

d. Other System Characteristics.

(1) Each JTR Set shall provide an operator-selectable capability to operate in listening silence (receive only) mode on any of its channels **(T)** and provide protection against hostile detection by non-radio means. **(O)**

RATIONALE: In tactical situations that require listening silence, operators will be able to prevent transmissions from their JTR Set, while maintaining the receive function. This may include a "Stealth" type profile where no radio transmissions emit from the platform. In this case, the radio then receives without transmitting network and management information (e.g., radio status report, link status, routing protocols, overhead reports etc.). This includes selectability on a channel-by-channel basis. The objective requirement recognizes that means other than radio frequency may be used to detect the presence and/or location of a JTR Set.

(2) For newly developed waveforms (e.g., WNW), and to the extent permitted by technology and the need for interoperability with legacy radio systems, the JTR System shall have the capability to counter threats as specified in applicable radio system's System Threat Assessment Reports (STAR). **(T)**

RATIONALE: The JTR System must be as EW survivable as the forces it supports to ensure mission accomplishment.

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(3) Newly developed JTR System waveforms (e.g., WNW) shall incorporate a mode to invoke (as technology permits) Low Probability of Interception (LPI), Low Probability of Detection (LPD), and Low Probability of Exploitation (LPE) techniques. **(T)**

RATIONALE: This capability allows warfighters the option to trade waveform performance criteria to gain increase security and survivability.

(4) The JTR System shall effectively operate in environmental conditions as specified in the domain annexes, to include Electromagnetic Environmental Effects (E3) environments and Hazards and Electromagnetic Radiation to Ordnance (HERO). **(T)**

RATIONALE: The JTR System will support forces deployed worldwide.

(5) The JTR System shall survive the effects of Electrostatic Discharge (ESD) and Near Strike Lightning (NSL) to the extent that the operator can restore full performance. **(T)**

RATIONALE: Lightning is hazardous to platforms/systems and provision for lightning protection should be incorporated in the design. The system shall control and dissipate the build-up of electrostatic charges caused by precipitation static (p-static) effects, fluid flow, air flow, space and launch vehicle charging, and other charge generating mechanisms to avoid fuel ignition and ordnance hazards, to protect personnel from shock hazards, and to prevent performance degradation of damage to electronics.

(6) The JTR System shall meet applicable NSA emanation standards, including TEMPEST. **(T)**

RATIONALE: TEMPEST covers compromising emanations, which are either conducted or radiated.

(7) The JTR Set shall be capable of being operated and maintained in a nuclear, biological, and chemical (NBC) environment to include decontamination procedures using existing solvents. **(T)**

RATIONALE: NBC contamination survivability requires that mission essential systems survive the nuclear residual effects of radioactive contaminants and neutron induced gamma activity as well as chemical/biological contaminants. This is separate from surviving initial effects of nuclear weapons (i.e. HEMP).

(8) Human computer interfaces for JTR Sets shall maintain consistency for specific platform implementation, **(T)** and between JTR Set versions. **(O)**

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RATIONALE: The human computer interface of JTR Sets will vary with types of host platforms and operational missions, however consistent interface units between vendors allow for commonality between JTR Sets.

(9) Each JTR Set shall be capable of incorporating power management to achieve maximum efficiency as specified in domain annexes. **(T)**

RATIONALE: The JTR sets are constrained to operate within power constraints of existing host platforms. Power consumption management conserves available power.

(10) Each JTR Set shall be capable of withstanding voltage surges and energy dissipation capacity in its operational environment to the extent that the operator can restore full performance. **(T)**

RATIONALE: Military platforms are subject to variations in primary power derived from field generator. A JTR Set will continue to operate through power surges or be restored to operations following a power surge event within the usual power-up time for the Set.

(11) To operate globally, each JTR Set shall comply with applicable National and International spectrum management policies and regulations; be mutually compatible with other electric or electronic equipment within its expected operational environment; and be approved by the United States Military Communication Electronic Board (MCEB) application for equipment frequency allocation and associated Joint frequency working group file number. **(T)**

RATIONALE: Each JTR Set will co-exist with other equipment and operate in its operational environment without interference between the JTR System and other systems that may be operating. To support worldwide deployment, the JTR System will be expected to adhere to existing national and international regulations.

(12) The JTR Set shall employ protective measures against electromagnetic pulse (EMP) and directed energy threats as required by the integrating platform. **(O)**

RATIONALE: This objective requirement recognizes that protection of JTR Set components against EMP and directed energy attacks is desired, but not required for all JTR Set applications. The Domain Annexes to the ORD specify specific cases in which the protection is required. Protection against EMP is required where damage would endanger accomplishment of the mission.

(13) The JTR System shall employ efficient bandwidth utilization techniques. **(O)**

RATIONALE: The JTR System will be required to dynamically utilize available frequency bandwidth.

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(14) The JTR System shall provide for Future Narrowband Digital Terminal (FNBDT) signaling protocols inclusion to the System. **(O)**

RATIONALE: FNBDT is a signaling protocol that will allow establishment of communications interoperability among communications devices that share the same communications capabilities, but are not configured to communicate with each other. FNBDT sets the common configuration. Applications are for NATO usage and certain handheld devices.

(15) The JTR System shall provide warfighters with private point-to-point and conference call capability. **(T)**

RATIONALE: While the JTR System primarily provides networked communications, there will be occasions when private point-to-point and conference call capabilities will be desired. This capability provides the warfighters a means to conduct private voice conversations between designated users, regardless of their location or organizational affiliation. Further, using JTR Sets integrated within other Service or Joint communications transport systems, this capability is virtually extended into the other systems.

Example 1: An Army battalion commander deployed overseas needs to conduct a private telephone-like conference call with his company commanders. Using his application device (handset connected to his JTR Set), he presses a preset button that automatically establishes JTR System transport paths to connect the commanders' JTR Sets.

Example 2: The deployed battalion commander now needs to have a private point-to-point conversation with a staff officer at his division headquarters that is physically located at home station in the US. Using a directory and/or preset button, he initiates the call via his handset connected to the JTR Set. The JTR System automatically routes the call through the JTR System for hand-off to another system (e.g. WIN-T with integrated JTR Set). The WIN-T automatically extends connectivity for the call to another system (e.g. SATCOM, other Service system host nation, commercial cellular base stations, etc.).

(16) For newly developed waveforms (e.g., WNW), the JTR System shall maintain and guarantee the integrity of all information elements it is transporting to enable user confidence; information integrity shall be 99.99% **(T)** and 99.999% **(O)**

RATIONALE: Information sent by one user is required to be sent to the receiving user error free. The JTR System should not corrupt the data it is delivering.

(17) For newly developed waveforms (e.g., WNW), the JTR System shall support quality of service capabilities that ensure higher priority traffic is delivered ahead of regular traffic 99% **(T)** and 99.9% **(O)** of the time.

RATIONALE: Completeness and compliance with the GIG CRD.

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JTRS WAVEFORMS (By Priority: KPP / Threshold / Objective)

ID	KPP (K)	ID	THRESHOLD (T)	ID	OBJECTIVE (O)
W1	*SINGARS ESIP (VHF-FM Military Tactical AJ)	W7	UHF SATCOM Military Protocol (184)	W30	MSS [Waveform Family]
W2	*HAVE QUICK II (UHF-AM/FM/PSK Military Tactical AJ)	W8	HF-ISB ALE	W32	BOWMAN (UK HF/UHF Military Tactical) [Waveform and Equipment Family]
W3	*UHF SATCOM Military (181-182-183 "DAMA")	W9	HF-SSB ALE AJ		
W4	*EPLRS	W10	Link-11 / TADIL-A		
W5	*WNW	W11	STANAG 5066 (HF Message Protocol)		
W6	*Link 16 / TADIL-J	W12	STANAG 4529 (HF NB Modem)		
		W13	VHF-FM – Military Tactical		
		W14	HF ATC Data Link		
		W15	VHF-AM ATC		
		W16	VHF-AM ATC Extended		
		W17	VHF/UHF-FM LMR: (Land Mobile Radio & Public Safety w/ Project-25 and TETRA) [Waveform Family]		
		W18	VHF ATC Data Link (NEXCOM)		
		W19	UHF-AM/FM/PSK Military Tactical		
		W20	Link-4A / TADIL-C		
		W21	Link-11B / TADIL-B		
		W22	SATURN (UHF PSK AJ NATO)		
		W23	STANAG 4193 Mode S Level 4/5		
		W24	DWTS (UHF PSK WB LOS)		
		W25	Soldier Radio & WLAN & Advanced Capability [Waveform Family]		
		W26	COBRA		
		W27	MUOS-CAI (UHF SATCOM Military Obj.)		
		W28	Cellular Radio & PCS [Waveform Family]		
		W29	Link 22 / NILE		
		W31	IBS-M		
		W32	BOWMAN (VHF)		

TABLE 4-2

Note: Individual waveform characteristics are shown in Annex E.

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5. Program Support. Program support for the JTR System shall be in place when the initial operational capability is achieved, and shall be expanded, as necessary by each service prior to achieving full operational capability.

a. Maintenance Planning. The maintenance concept for JTR System shall be determined based on a level of repair analysis. Operator level maintenance shall be limited to reconfiguration for needed capabilities, and preventive/corrective maintenance shall be limited to the predetermined LRU. Life-cycle logistics support factors shall be implemented that provide for cost effective maintenance of the JTR Set components.

b. Support Equipment. Where the DoD logistics structure is used, General Purpose Electronic Test Equipment (GPETE) shall be selected from existing standard GPETE equipment lists. The use of Special Purpose Electronic Test Equipment (SPETE), special purpose support equipment, and special tools shall be avoided to the maximum extent possible. JTR System BIT/built-in-test equipment performance shall not be accomplished using GPETE, SPETE, or substituting modules. For all Non-Developmental Item equipment, the contractor shall identify Automatic Test Equipment. For contractor provided logistics support, equipment, and processes shall be identified.

c. C4I/Standardization, Interoperability, and Commonality.

(1) The JTR System shall use selected legacy waveforms and newly developed waveforms (e.g., Wideband Networking Waveform) to provide an adaptive, interoperable Joint C4ISR tactical and operational info-spheres to the warfighter. The ability for the JTR System to disseminate and gateway GIG and C4ISR data within like modes (frequency bands or waveforms) and between selected radio systems described in this ORD will ensure that all echelons (e.g., tactical warfighter to the sustaining base) receive the crucial COP/CTP. This will allow the warfighter (e.g., objective forces) the ability to see first, understand first, act first and finish decisively at the strategic, operational, and tactical levels of operations.

(2) The JTR System must interoperate with Joint, Combined, Federal Agencies and Public Safety, Allied/Coalition, and commercial systems as defined in the IERs (Appendix E). The JTR System must also comply with applicable information technology standards contained in the DoD JTA, to include compliance with DII/COE level 6 for threshold and level 8 for objective systems. Compliance with JTA standards must be IAW with DoD 4120.24 and CJCSI 6212.01. The JTR System will undergo C4I interoperability testing and the Joint Interoperability Test Center (JITC) as required by CJCSI 6212.01 will certify the test results. Testing will be performed in conjunction with other testing Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E) and will support the JITC/DISA interoperability certification recommendation to the Director, Joint Staff (J-6) in time to support Initial Operational Capability (IOC).

(3) The frequency range of the JTR Sets must be flexible enough to adapt to changes in DoD and non-DoD Government frequency spectrum allocations, as well as being capable of being used in

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civilian bands, both in the continental United States and overseas. The key steps to assure radio frequency spectrum support are spectrum certification, frequency assignments, and host nation coordination. The JTR System will support the DoD Defense in Depth Strategy.

(4) The JTR System shall have adequate security safeguards and compartmentalization to ensure the confidentiality, integrity, and availability of the information passing through or residing on it. Security features of the JTR System will comply with National Security Agency (NSA) and National Institute of Standards and Technology (NIST) rules and regulations and use security products, techniques, and protective services certified by NSA and NIST. All C⁴I resources will be certified IAW CJCSI 6212.01 for end-to-end interoperability through its ability to operate in a heterogeneous environment or its ability to operate with both similar and dissimilar networks. Processes (e.g., Secret and Below Interoperability (SABI)) that have been approved by the DoD Chief Information Officer (CIO) shall accomplish interconnection of systems operating at different classification levels. The system shall be certified and accredited in accordance with DoDI 5200.40, the DoD Information Technology Certification and Accreditation Process and DCID 6/3, Protecting SCI within Information Systems.

(5) Each JTR Set must be mutually compatible with other spectrum dependent equipment within its intended environment(s). The JTR System shall comply with applicable national and international spectrum management statutes, policies and regulations, to include obtaining spectrum supportability in all host nations where deployment of the system or equipment is planned. Spectrum supportability includes spectrum certification, frequency assignments, and host nation coordination.

(6) The JTR System architecture must be consistent with National Airspace System architecture to include compliance with emerging Air Traffic Control communications navigation and surveillance, and Global Air Traffic Management requirements.

(7) For operation with NATO members and allies, the technical characteristics of the JTR System should conform to the applicable requirements of the Standardization Agreements and Allied Communications Publications.

(8) All information technology for the JTR System shall be DoD approved and where applicable, selected from those contained in the DISA approved "Profile of Standards."

(9) Information Assurance (IA). With increasing dependence on interconnected networks, information technology systems (data, video, voice) require protection (e.g. access control lists, firewalls, guards, intrusion detection systems, and malicious code detection). JTR System network(s) will use NSA-approved IA tools to protect, detect, and react to adversarial actions against the network or components of the network. These tools will include appropriate security protection mechanisms (e.g. Public Key Infrastructure, boundary protection mechanisms, and automatic intrusion detection systems) to ensure the concepts of the DoD Defense in Depth strategy are satisfied in accordance with applicable regulations.

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d. Computer Resources.

(1) System software for the JTR System will be developed to conform to appropriate DII/COE protocols and standards.

(2) The components of the JTR System shall provide checks for computer operations system viruses during systems initialization and routine operations. The virus protection software shall be capable of virus database updates on a regular basis over the network. The operator shall be alerted to a detected virus.

(3) A software support capability for the JTR System shall be functional by JTR System Initial Operational Capability and must provide for update, configuration control, and management of all computer programs and data.

(4) The use of mobile code technologies will be IAW ASD C31 Memorandum: Policy Guidance for use of Mobile Code Technologies in DoD Information Systems.

e. Human Systems Integration.

(1) Manpower and Force Structure Assessment. Operation, maintenance and network management of the JTR System should not require additional manning. Initially, additional manning may be required in the areas of maintenance and network management of the JTR System. In addition, the JTR System should not require new skill qualifiers. Efforts shall be made to reduce manpower requirements.

(2) Training and Documentation.

(a) Concept. The JTR System operators and maintainers must train in peacetime, as they will fight in war. Commanders in garrison must be able to stress and train on the communications capabilities provided by the JTR System. Training products will be focused on how to effectively operate and maintain the JTR System under stressful, real-world, wartime conditions. System design will minimize training costs and time. Maximum emphasis will be placed on Distance Learning technologies that reduce the requirement for trainers to travel to all units receiving the JTR System.

(b) Operational and maintenance training will be provided during New Equipment Training (NET) and initial fielding. Follow-on training will be provided through service-specific, formal, training channels. As indicated by training analysis, operator and maintainer training will be embedded into JTR System components.

(c) Training Support Packages (TSP). Individual and Collective TSPs must be developed for the JTR System. Operator and maintainer training will be embedded into each radio sufficient to allow full training in unit. Embedded training will be designed in from the beginning and will be tested

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during operational testing. The TSPs will be interactive multi-media simulations based programs presented on the operational system that can be delivered as web based training or can be accessed on a computer based system in a classroom or in a learning center environment. The TSPs will be designed to support effective training for operators, maintainers, and leaders in live virtual and constructive environments. For the individual, the package will have a self-tutor program to support orientation, indoctrination, operational capabilities, functionality, and detailed individual operator training in data entry, moving between menus and screens, and data retrieval. The program will critique operator progress through the training and provide remedial training as necessary. For collective training, the package must provide scenario driven training programs tailored to specific mission and contingency plans so units and staffs can practice, rehearse, and train under expected mission conditions. The program will critique all aspects of the collective exercise and provide remedial training as required.

Training will exploit the right mix of live training and simulation tools to maximize the effectiveness of individual and collective training. The NET developed products can serve as the basis for institutional training development, unit sustainment, and rapid train-up of replacement personnel in support of contingency operations. All training products will be Sharable Content Object Reference Model (SCORM) ROM compliant and reusable for resident training and Distance Learning. All simulations and simulators will be High Level Architecture (HLA) compliant. Standard accurate data and models of the JTR System will be developed for use in current and future virtual and constructive simulators/simulations (e.g., the Warfighter's Simulation). Interactive Courseware (ICW) and Structured Interactive Application Training modules will be embedded into mission application environments as TSPs. These modules may be delivered via network servers, CD-ROM, or Web-based training. TSPs for an individual system include the sum total of the training support products and training infrastructure required to execute the training strategy for institutional, unit sustainment and new equipment training. Training Support Products will include Training Aids, Devices, Simulators and Simulations (TADSS), Embedded Training, Web Based Training, Computer-Assisted Training Lesson Plans, Program of Instructions (POIs), Doctrine Tactics Techniques and Procedures, and Electronic Technical Manuals. Training support infrastructure may include; classrooms/training facilities, fixed tactical internet and training instrumentation systems for homestation, Combat Training Centers (CTCs), and while deployed. The proponents and the Program Manager will perform a training analysis and design the most appropriate and cost effective training products, delivery methods, and life cycle training support for the JTR System.

(d) It is essential that the training base for each service be equipped with JTR Sets before the operational units in order for service personnel to be adequately trained.

(e) Essential details regarding training are referenced in the Services' training plans.

(3) Human Engineering Constraints. The JTR System must be easily maintainable and operable, incorporating the principles of modularity and commonality. The JTR Set displays and controls must be viewable in direct sunlight, at night and through night-vision goggles. Each JTR Set

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component shall conform to applicable human engineering design criteria. Domain Annexes further define these requirements.

(4) Environmental, Safety and Occupational Health (ESOH). The JTR System must comply with the environmental, safety and health requirements of appropriate sections of DoDD 5000.1, DoDI 5000.2-R, DoD Memorandum, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs, and all other Federal ESH laws and regulations. The JTR System will have the ability to train, operate, be maintained, and disposed of in full compliance with U.S. environmental quality laws and regulations. The JTR System will be designed to eliminate or minimize environmental quality impacts. Design selection criteria will eliminate or reduce the use of hazardous chemicals or materials and Ozone Depleting Chemicals during the manufacture, use, and disposal of the system.

f. Other Logistics and Facilities Considerations. For Army and Air Force employment, logistics support should include sufficient quantities of Mobility Readiness Spares packages and Primary Operating Stocks for continued supportability. For the Navy and Marine Corps, spares will be based on the On Board Repair Parts requirements, as calculated for each platform. If required, spares will be pre-positioned. In compliance with the Continuous Acquisition Lifecycle Support program, the JTR System shall comply with specifications and standards approved within DoD for creation, use, and management of technical and other data in digital form.

g. Transportation and Basing. The JTR System distribution and basing will be consistent with existing force structures and deployment concepts. If the JTR Set components are integrated into other systems, transportability requirements of the host system apply.

h. Geospatial Information and Services. When required, the JTR System components will use National Imagery and Mapping Agency (NIMA) joint service mapping standards to ensure interoperability with other systems. Geographic mapping and gridding functions will be based on Universal Transverse Mercator and latitude/longitude coordinates referred to by the World Geodetic System 84, be compatible with existing GPS receivers, and upgradeable to future GPS receivers (e.g., SAASM).

i. Natural Environmental Support. Forecasts of Meteorology and Oceanography (METOC) conditions affecting SATCOM and JTR System performance will be provided as standard products from a Joint or service METOC activity.

j. Joint Program Designation.

(1) Army: Joint.

(2) Navy: Joint.

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(3) Air Force: Joint.

(4) Marine Corps: Joint.

6. FORCE STRUCTURE. Based upon Subject Matter Expert (SME) initial analyses, the estimated quantity of JTR Sets needed for equipping the total force is:

a. US Army.

JTR SET	CHANNELS	OPERATIONAL	SPARES	TRAINING	TOTAL
*SMALL FORM FIT	GPS +1	TBD	TBD	TBD	TBD
*SMALL FORM FIT	GPS +2	44,001	2,200	880	47,081
HAND-HELD	GPS +1	7,222	361	144	7,727
HAND-HELD	GPS +2	18,565	928	371	19,864
MAN PACK	GPS +2	23,091	1,155	462	24,708
**VEHICULAR	GPS +6	121,854	6,093	2,437	130,384
AIRBORNE	GPS +8	2,990	150	60	3,200
MARITIME/FIXED	GPS +4	124	7	3	134
TOTAL		217,846	10,894	4,357	233,097

TABLE 6-1

b. US Air Force.

JTR SET	CHANNELS	OPERATIONAL	SPARES	TRAINING	TOTAL
SMALL FORM FIT	GPS +1	TBD	TBD	TBD	TBD
SMALL FORM FIT	GPS +2	TBD	TBD	TBD	TBD
HAND-HELD	GPS +1	17,250	690	173	18,113
HAND-HELD	GPS +2	5,750	230	58	6,038
MAN PACK	GPS +2	1,262	60	20	1,342
VEHICULAR	GPS +6	4,107	165	45	4,317
AIRBORNE	GPS +8	4,600	184	46	4,830
MARITIME/FIXED	GPS +4	2,933	120	30	3,083
TOTAL		35,902	1,449	372	37,723

TABLE 6-2

c. US Navy.

JTR SET	CHANNELS	OPERATIONAL	SPARES	TRAINING	TOTAL
SMALL FORM FIT	GPS +1	TBD	TBD	TBD	TBD
SMALL FORM FIT	GPS +2	TBD	TBD	TBD	TBD
HAND-HELD	GPS +1	1,755	195	0	1,950
HAND-HELD	GPS +2	0	0	0	0
MAN PACK	GPS +2	2,745	305	0	3,050
VEHICULAR	GPS +6	1,874	208	0	2,082
AIRBORNE	GPS +8	1,370	120	20	1,510
MARITIME/FIXED	GPS +4	4,000	200	50	4,250
TOTAL		11,744	1,028	70	12,842

TABLE 6-3

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d. US Marine Corps.

JTR SET	CHANNELS	OPERATIONAL	SPARES	TRAINING	TOTAL
SMALL FORM FIT	GPS +1	189	0	0	189
SMALL FORM FIT	GPS +2	TBD	TBD	TBD	TBD
HAND-HELD	GPS +1	18,050	740	210	19,000
HANDHELD	GPS +2	0	0	0	0
MAN PACK	GPS +2	14,320	600	155	15,075
VEHICULAR	GPS +6	1,390	590	150	2,130
AIRBORNE	GPS +8	***	***	***	***
MARITIME/FIXED	GPS +4	0	0	0	0
TOTAL		33,949	1930	515	36,394

TABLE 6-4

*Note: See Annex C, Para 4.a.(1)(d) and 4.a.(3)(d)

**Note: Vehicular JTR Set quantities include Dismountable Set configuration.

***Note: Marine Airborne requirement are included in the Navy Airborne requirements.

Note: The USMC source document for Approved Acquisition Objective (AAO) is established in the Service-specific Marine Corps JTR System Migration Strategy.

e. Others. Other DoD and non-DoD organizations will identify requirements for JTR Sets through input to the appropriate Service acquisition plan.

7. Schedule.

a. Incremental Blocks. The family of JTR Sets will be developed in incremental blocks providing increased capabilities with succeeding blocks as annotated in each Domain Annex. Note: Dates are Initial Operational Capability.

b. Initial Operational Capability (IOC). IOC is attained when each requirements block meets all threshold requirements specified in each domain requirements blocking tables; training has been completed for the block; the first unit is equipped with authorized equipment, personnel and training materials to support unit sustainment training; and required maintenance and training support programs are in place.

c. Full Operational Capability (FOC). FOC is attained for each requirements block when all units designated to receive the block are fully equipped with the authorized JTR System as defined above for IOC.

d. Number of Operational and Support Personnel. TBP.

e. Facilities and Support Infrastructure. TBP.

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f. Organizational, Intermediate, and Depot Support Elements. TBP.

g. Schedule Impact. If IOC is not achieved by required dates of the blocked schedule, procurement of additional legacy systems may be needed to support emerging weapons systems and digitization of the force. If FOC is delayed, operations of forces not equipped will be degraded and support for legacy systems will rapidly become unaffordable.

8. Program Affordability.

a. Affordability. Affordability of the JTR System must be viewed in the context of the powerful new capabilities it brings to the warfighter. It is not simply a replacement for legacy radios. It will achieve tactical radio interoperability throughout the DoD for the first time ever. It is a wideband data networking radio that brings the power of networking to the warfighter, enabling network centric operations and the near real time internetting of sensors, fires, intelligence, and decision makers. Affordability is also addressed in the context of the cost-avoidance achieved through cascading legacy radios as the JTR System is fielded. (Initial fieldings of the JTR System will be to users with *new* wideband data radio requirements not currently satisfied. But as these users receive their JTR System, the functionality formerly provided by their legacy radios is now provided on channels on their JTR System, and the legacy radios are then available for redistribution to the next users on the priority list for those legacy radios.) Per unit threshold and objective prices considered affordable by the warfighter for various configurations are in paragraph 8 of each domain annex.

b. Cost. Services will plan JTR System acquisition programs to remain affordable by developing acquisition strategies that incorporate CAIV initiatives to keep program resource requirements within both FYDP and long range DoD investment and force structure. Program costs will be incrementally reduced during the life of the program as JTR Sets replace greater numbers of legacy radios. Finally, service acquisition strategies will be structured such that the procurement of a JTR Set costs less than the combined capabilities of the radio systems it will replace. Each procurement must also be structured to demonstrate increasing interoperability, flexibility, and adaptability.

c. Cost as an Independent Variable (CAIV). PM JTRS (Army) conducted a CAIV analysis in 2001 against the requirements in JTRS ORD Version 2.3. As new requirements are added, CAIV analyses will be conducted. The CAIV analysis was done in conjunction with members of the Cost Performance Working Integrated Product Team (WIPT) with representatives from the users and materiel development communities across DoD and industry. The analysis incorporated the results of two CAIV studies that were completed pre-2001 and the JTRS JPO Program Office (JPO) analysis of the CAIV studies. The PM JTRS Army CAIV analysis generated target costs for JTR Sets ranging from 2-7 channels for Ground vehicular systems, 8 channel Rotary Wing systems, and Tactical Air Control Party systems with Link 16 capability. CAIV targets are based on the procurement of approximately 10,000 vehicular and rotary wing JTR Sets per year over a 10-year period, and are within the threshold "affordability" prices established by the warfighter.

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d. Life Cycle Program Costs. Because JTR System is a family of radios and radio system developments, life cycle costs will be developed for each member of the family. Life cycle costs will be developed on a per block basis. Unit production cost objectives will be determined with each Service/domain procurement program. These life cycle costs will be included in the appropriate Service/domain management plan. The JTR System will minimize total life cycle tactical radio system costs to DoD. This will be through the consolidation of numerous radios' functionality into a single radio system, hardware reuse through a common architecture and software upgrades, consolidation of service requirements into single domain buys, and a consolidation of radio system operator and maintenance training and logistics support.

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ANNEX A

AIRBORNE DOMAIN

1. General Description of Operational Capability. No change.

a. Mission Need (Supplemental). Mission Needs Statement Summary. No change.

b. Overall Mission Area. The JTR System will be employed in civilian and military (fixed wing, rotary, and unmanned) airborne platforms to support the mission areas defined in this ORD.

c. Proposed System (Supplemental). The airborne JTR Set will provide an integrated and modular communications capability. Individual platform requirements will define the capabilities provided by JTR sets, and their respective levels and complexities.

d. Missions to Accomplish. No change.

e. Operational and Support Concept/Operational Concept (Supplemental). The JTR System will support the communications capabilities of platforms throughout their operational deployments. The JTR System equipment will be operated and maintained in accordance with the standard operating procedures for the host platforms that it supports.

f. Benefits of Evolutionary Acquisition. No change.

2. Threat. No change.

a. Threat to be Countered. No change.

b. Projected Threat Environment. No change.

c. System Threat Assessment Report. No change.

3. Shortcomings of Existing Systems and C4ISR. No change.

4. Capabilities Required. No change.

a. System Performance. The JTR System shall meet the following supplemental airborne specific performance parameters:

(1) General Performance Requirements:

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(a) The airborne JTR Sets shall meet required performance parameters when integrated into land and sea based fixed, rotary wing, and unmanned aircraft. **(T)**

RATIONALE: The JTR Sets will operate with intended systems in their environment.

(b) The airborne JTR Sets will provide the following interfaces to existing aircraft peripheral equipment for operation in all host platforms:

1. Integrated visual displays: Each JTR Set will provide interfaces for host platform visual displays. **(T)**

2. Input/output devices: Each JTR Set will provide standard interfaces for host platform audio and data input/output devices, including control and traffic platform busses. **(T)**

3. Remote control devices: Each airborne JTR Set will provide for remote control and operation via a remote control unit or through the host platform bus interface. **(T)**

4. The JTR System airborne system will be fully Night Vision Goggle (NVG) compatible. **(T)**

RATIONALE: Stated interfaces will enable integrated operation of JTR Sets with various host systems.

(c) Each airborne JTR Set will support electronic protection (EP) and non-EP preset operation of channels by providing a minimum of 25 presets for each operating waveform that supports presets **(T)** and a minimum of 100 presets for each operating waveform that supports presets. **(O)**

RATIONALE: Stated presets will enable operators to quickly switch parameters during operations.

*(d) In addition to GPS, each airborne JTR Set shall be designed to be modular and will provide a scaleable number of channels, up to eight channels **(T)**, with growth capability up to ten channels. **(O)**

RATIONALE: Mission requirements have necessitated simultaneous operations in multiple voice and digital networks. This requirement supplements the (scaleable channels) KPP at ORD paragraph 4.a.(1)(h). There is also linkage to the (internal growth) KPP at ORD paragraph 4.a.(1)(b) in that, through an open systems architecture approach that features modular, scaleable, and flexible form factors, each (all) JTR Sets can be scaled to the channel requirements stated above. This requirement is subject to the JTR Set hardware and software configuration selected to meet specific user requirements (i.e. the number of channels required will be platform dependent based upon mission

* Specifies airborne requirement for KPP, 4.a.(1)(e).

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and space available for the specific platform). For example, tactical fighter aircraft will have fewer channel requirements and greater power/space limitations than larger C2 and mobility aircraft. Therefore, a four-channel configuration may meet and fit a TACAIR requirement, while an eight-channel configuration may be needed to meet and fit other aircraft requirements. The form, fit and function requirements of the various aircraft hosts differ and the various channel and waveform configurations constituting each individual JTR Set are tailored for that aircraft mission. Each of these JTR Sets is required to meet only the performance that it is configured to meet. Further, a JTR Set that is configured to meet a specific user requirement for channels and waveforms is not required to operate any other channel/waveform configuration without reconfiguration of the HW and/or SW suite that constitutes the JTR Set. Each JTR Set configuration is deemed to meet the multi-channel requirement identified in ORD paragraph 4.a.(1)(h) as long as performance is fully met for the configuration.

(e) Each airborne JTR Set shall provide the capability to choose from among at least 10 waveforms stored within the JTR Set, without loading additional software from an external source, and replace waveforms over-the-air or using a bulk storage device containing up to 30 waveforms. **(T)**

RATIONALE: Stated waveforms are deemed sufficient to meet current and future operational needs.

(2) Security Performance Parameters: No change.

(3) Networking Performance Parameters: No change.

(4) Network Management: No change.

b. Information Exchange Requirements. No change.

c. Logistics and Readiness. No change.

d. Other System Characteristics.

(1) Physical Integration into User Platforms:

(a) Integration of JTR Sets into user platforms shall be accomplished with minimal demands for platform modifications. The JTR System shall provide radio sets that have the following characteristics:

1. Size/Weight: Each Fixed Wing airborne JTR Set shall be no larger or heavier than the equipment that it replaces **(T)** and at least 75% smaller and lighter. **(O)**

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RATIONALE: The size/weight of the JTR Set will not exceed the size/weight of the legacy radio equivalents for the waveforms operating in the JTR Set. Decrease size/weight of the JTR Set will allow area and weight for other mission critical systems.

2. Each Rotary Wing airborne JTR Set shall be no larger or heavier than the currently installed equipment it replaces **(T)** and at least 75% smaller and lighter. **(O)**

RATIONALE: The weight of JTR Set will not exceed the weight budget of current platforms and decreased weight of JTR Set will allow more weight for other mission critical systems.

3. Prime power: Each airborne JTR Set will operate off existing aircraft power systems for its intended platform. **(T)**

RATIONALE: This requirement obviates need for new power systems.

4. Prime power: Each airborne JTR Set will draw no more power than the equipment that it functionally replaces **(T)** and draw at least 75% less power. **(O)**

RATIONALE: The power consumption of the JTR Sets will not exceed the power consumption of the legacy radio equivalents for the waveforms operating in the JTR Set. Decreased power consumption of the JTR Set will make more power available to other platform systems.

5. Frequency management: Each airborne JTR Set will provide interfaces to on-board automated frequency management systems. **(T)**

RATIONALE: This interface will allow integrated operations without need for modification to current on-board systems.

(b) Each JTR Set shall survive High-Altitude Electromagnetic Pulse (HEMP) to the degree specified in MIL-STD 2169B but not be required to work through the event. **(T)**

RATIONALE: The JTR System is a mission critical system and unless protected from HEMP, the electronic circuitry of JTR System components will be susceptible to significant and permanent destruction during a HEMP event.

(2) Personnel Health and Safety:

(a) Each JTR Set shall be capable of being operated and maintained in a nuclear, biological, and chemical (NBC) environment by persons in full Mission Oriented Protective Posture IV (MOPP IV) protection gear. **(T)**

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RATIONALE: The JTR System components will be operated and maintained by typical warfighters under all environmental conditions.

(b) Adhere to the guidance of applicable Military Standards intended to preclude or minimize exposure to health hazards and threats to warfighter survivability. (T)

RATIONALE: User personnel will not be exposed to unreasonable hazards.

5. Program Support. No change.

a. Maintenance Planning. No change.

b. Support Equipment. No change.

c. C4I/Standardization, Interoperability, and Commonality. No change.

d. Information Assurance. No change.

e. Computer Resources. No change.

f. Human Systems Integration. All final manpower, personnel, and training (MPT) requirements will be documented in Service training plans.

g. Other Logistics Considerations. No change.

h. Transportation and Basing. No change.

i. Geospatial Information and Services (GI&S). No change.

j. Natural Environmental Support. No change.

6. Force Structure. No Change.

7. Schedule. No Change.

8. Program Affordability.

a. The warfighter is willing to pay the cost of each JTR Set listed in the below Table A-1 – A-2.

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b. Each channel will operate the waveforms identified in the Airborne Domain Supported Waveforms Table. The Link 16 capability will increase the cost an additional \$60K.

Rotary Wing Affordability Targets

	Threshold	Objective
GPS + 8 Channel	\$149K	\$74.5K

TABLE A-1

Fixed Wing Affordability Targets

	Threshold	Objective
GPS + 8 Channel	TBD	TBD

TABLE A-2

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	AIRBORNE DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.a.(1)	SYSTEM PERFORMANCE			
4.a.(1)(a)	System Support of Communications	X		
4.a.(1)(b)	Program Growth Capability (KPP)	X		
4.a.(1)(c)	Software Re/Configuration (KPP)	X		
4.a.(1)(d)	Hardware Re/Configuration	X		
4.a.(1)(d)	Each JTR Set shall have the ability to be reconfigured (hardware software and firmware changes/upgrades) by the operator			X
4.a.(1)(e)	Routing and Retransmission (KPP)	X		
4.a.(1)(e)	Supports Objective Waveforms to be programmable to automatically route and retransmit			X
4.a.(1)(g)	Domain Radio Frequency Operation Range	X		
4.a.(1)(g)	Incorporates military and commercial satellite and terrestrial communications above 2 GHz			X
4.a.(1)(h)	Multi Channel Operation (KPP)	X		
4.a.(1)(i)	Provides Automatic Protocol Conversions and Message Format Conversions between like modes of voice, video, and data	X		
4.a.(1)(j)	Provides Over-The-Air software upgrades	X		
4.a.(1)(k)	Ability to scan a minimum of 10 operator and or network manager designated fixed frequencies or presets per channel	X		
4.a.(1)(k)	Ability to scan individual frequency bands			X
4.a.(1)(l)	Installation Kits and Ancillary Interfaces	X		
4.a.(1)(m)	Power Restoration	X		
4.a.(1)(n)	Standard Interface	X		
4.a.(1)(o)	GPS Channel	X		
4.a.(1)(p)	Integrated GPS Port		X	
4.a.(1)(q)	Support Core Set of Capabilities IAW JTRS ORD Annex D	X		
4.a.(1)(r)	Joint Network Interoperability/IERs for critical Service and Joint (KPP)	X		
4.a.(1)(r)	Provides 100% of top-level IERs with Service, Joint Allied/Coalition and commercial networks as applicable to mission			X
4.a.(1)(s)	Operate at full performance levels and not degrade effectiveness of host systems	X		
4.a.(2)	SECURITY PERFORMANCE			
4.a.(2)(a)	Embedded Programmable Crypto/Benign Fill	X		
4.a.(2)(b)	Multiple Single Levels of Security from Unclassified up to Secret and Top Secret / Sensitive Compartmented Information (TS/SCI) System High		X	
4.a.(2)(b)	Multi-Level Security from Unclassified through Top Secret/ Sensitive Compartmented Information (TS/SCI)			X
4.a.(2)(c)	TRANSEC	X		
4.a.(2)(c)	Provide TRANSEC capabilities and specifications for radios/waveforms that may be Incorporated into JTR Systems in the future			X
4.a.(2)(d)	Electronic Key Management System (EKMS)	X		
4.a.(2)(e)	Over the Air Transfer	X		

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	AIRBORNE DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.a.(2)(f)	Remote ID and Exclusion	X		
4.a.(2)(g)	Crypto Retention	X		
4.a.(2)(g)	After primary power loss each JTR Set shall be capable of retaining CRYPTO variables up to 144 hrs			X
4.a.(2)(h)	Capable of detecting an unexpected degradation of power and placing itself in a known secure state.		X	
4.a.(2)(i)	Capable of implementing NSA and /or NIST approved public key cryptography	X		
4.a.(2)(j)	Crypto Systems Interface	X		
4.a.(2)(k)	CCI Storage: Each JTR Set capable of being handled as an unclassified Controlled Cryptographic Item (CCI).	X		
4.a.(2)(k)	When zeroized, each JTR Set shall be capable of being handled as unclassified non-CCI material by employing technology approved by NSA which minimizes or eliminates risk of exploitation of the embedded device that provides security			X
4.a.(2)(l)	Zeroization	X		
4.a.(2)(m)	Capability for the operator and network manager to zeroize all channels in the JTR Set and to selectively zeroize individual channels	X		
4.a.(2)(n)	Each JTR Set shall feature a tamper detection capability	X		
4.a.(2)(o)	Defense Information Infrastructure (DII)/Common Operating Environment Key Management	X		
4.a.(3)	NETWORK PERFORMANCE			
4.a.(3)(a)	Scaleable Networking (KPP)	X		
4.a.(3)(b)	Network Extension/Coverage (KPP)	X		
4.a.(3)(c)	Scaled Communications	X		
4.a.(3)(d)	Mobile Users	X		
4.a.(3)(e)	Routing	X		
4.a.(3)(e)	The network JTR System shall provide routing capability, interface connectivity that extends into cellular radio networks		X	
4.a.(3)(f)	Dynamic Routing	X		
4.a.(3)(g)	Provide hardware/software and routing mechanisms to provide routing connectivity between different networks	X		
4.a.(3)(h)	Situational Awareness	X		
4.a.(3)(i)	Network Throughput and Latency	X		
4.a.(3)(i)	Provide increase information flow through the addition of new waveforms and/or protocols			X
4.a.(3)(j)	JTR System Network Supports a Name-To-Address Translation Service	X		
4.a.(3)(k)	Supports the capability for users to address data to other users by using position/organization names in the address field	X		
4.a.(3)(l)	The JTR System shall provide the means to support message delivery based on geographic area			X
4.a.(3)(m)	System Reconfiguration of a network of 150 JTR Sets within 15 minutes	X		
4.a.(3)(m)	System Reconfigure of a network of 150 JTR Sets within 5 minutes			X
4.a.(3)(n)	Asymmetric Networking	X		
4.a.(4)	NETWORK MANAGEMENT			

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	AIRBORNE DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.a.(4)(a)	Interoperate with Joint Network Management Tools Systems	X		
4.a.(4)(b)	Remotely Identify and Configure User Access	X		
4.a.(4)(c)	Status Reporting	X		
4.a.(5)	SPECTRUM MANAGEMENT			
4.a.(5)(a)	Report to Spectrum Management Systems	X		
4.a.(5)(b)	Spectrum Management of JTR System Waveforms	X		
4.a.(5)(c)	Automatic Selection of Frequency		X	
4.a.(5)(d)	Dynamic Frequency Management/Allocation		X	
4.c.	LOGISTICS AND READINESS			
4.c.(1)	Channel Operational Availability A(o) of 0.96 (KPP)	X		
4.c.(1)	Channel Operational Availability A(o) of 0.99 (KPP)			X
4.c.(2)	JTR Set hardware size and weight be compatible with specifications in domain annexes	X		
4.c.(3)	Logistically Supportable Within Each Service	X		
4.c.(4)	Built-In-Test; capable of fault isolation to LRU	X		
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)	Listening Silence	X		
4.d.(1)	Listening Silence and provide protection against hostile detection by non-radio means			X
4.d.(2)	Electronic Warfare Survivable	X		
4.d.(3)	LPI/LPD/LPE Techniques		X	
4.d.(4)	Elimination of all Electromagnetic Environmental Effects	X		
4.d.(5)	The JTR System shall survive the effects of Electrostatic Discharge (ESD) and Lightning Effects	X		
4.d.(6)	The JTR System shall meet applicable NSA emanation standards, including TEMPEST.	X		
4.d.(7)	Capable of being operated, maintained, and decontaminated in a biological, and chemical environment	X		
4.d.(7)	Capable of being operated, maintained, and decontaminated in a nuclear environment		X	
4.d.(8)	Human Computer Interfaces	X		
4.d.(8)	Human Computer Interfaces and maintain consistency between JTR Set versions			X
4.d.(9)	Incorporates Power Management	X		
4.d.(10)	Withstanding Voltage Surges and have Energy Dissipation Capacity	X		
4.d.(11)	Spectrum Management Policy/Global Operations	X		
4.d.(12)	Employ protective measures against EMP and directed energy threats			X
4.d.(13)	Employ efficient bandwidth utilization to include data compression			X
4.d.(14)	Provide for Future Narrowband Digital Terminal signaling protocols inclusion to the system			X
4.d.(15)	Point-to-point and Conference Call Capability		X	
4.d.(16)	Information Integrity	X		
4.d.(17)	Quality of Service	X		
8.c	COST AS AN INDEPENDENT VARIABLE (CAIV)			
8.c	Cost as an Independent Variable (CAIV)	X		

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	AIRBORNE DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
8.c.	Cost as an Independent Variable with an objective to reduce initial costs by 50 percent			X
	ANNEX A			
	AIRBORNE SYSTEM PERFORMANCE REQUIREMENTS			
4.a.(1)(a)	Airborne JTR Set shall meet required performance parameters when integrated into land and sea based fixed, rotary wing and UAV	X		
4.a.(1)(b)1	Integrated Visual Displays	X		
4.a.(1)(b)2	Provide Standard Interfaces for host platform	X		
4.a.(1)(b)3	Remote Control Device	X		
4.a.(1)(b)4	Night Vision Goggle Compatible	X		
4.a.(1)(c)	Support Electronic Protection (EP) and non-EP present operation of channels with a minimum of 25 channels	X		
4.a.(1)(c)	Support Electronic Protection (EP) and non-EP present operation of channels with a minimum of 35 channels			X
4.a.(1)(d)	Provide a GPS + 8 channel JTR Set Capability	X		
4.a.(1)(d)	Provide a GPS + 10 channel JTR Set Capability			X
4.a.(1)(e)	Store 10 waveforms within set, and replace waveforms over-the-air or provide a bulk storage device for 30 waveforms	X		
	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)(a)1	JTR Set will be no larger or heavier than equipment that it replaces	X		
4.d.(1)(a)1	JTR Set will be at least 75% smaller and lighter than equipment that it replaces			X
4.d.(1)(a)3	Operate off existing aircraft power	X		
4.d.(1)(a)4	Each airborne JTR Set will draw no more power than the equipment it replaces	X		
4.d.(1)(a)4	Each airborne JTR Set will draw at least 75% less power than the equipment it replaces			X
4.d.(1)(a)5	Interfaces to on-board automated frequency management systems	X		
4.d.(1)(b)	Survive HEMP	X		
4.d.(2)(a)	Capable of being operated and maintained in an NBC environment	X		
4.d.(2)(b)	Adhere to the guidance of applicable Military Standard (e.g. health standards, threats etc.)	X		
	ROTARY WING SYSTEM PERFORMANCE			
4.d.(1)(a)2	Each Rotary Wing Set shall be no larger or heavier than the currently installed equipment it replaces	X		
4.d.(1)(a)2	Each Rotary Wing Set shall be at least 75% smaller and lighter than the currently installed equipment it replaces			X

TABLE A-3

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	AIRBORNE DOMAIN SUPPORTED WAVEFORMS	FY-06	FY-07	FY-08	OBJ
WF#1	*SINGARS ESIP (VHF-FM Military Tactical AJ)	X			
WF#2	*HAVE QUICK II (UHF-AM/FM/PSK Military Tactical AJ)	X			
WF#3	*UHF SATCOM Military (181-182-183 DAMA)	X			
WF#4	*Enhanced Position Location Reporting System (EPLRS)	X			
WF#5	*Wideband Networking Waveform (WNW)	X			
WF#6	*Link 16 / TADIL-J	X			
WF#7	UHF SATCOM Military Protocol (184)	X			
WF#8	HF Independent Side Band (ISB) w/Automatic Link Establishment (ALE)	X			
WF#9	HF Single Side Band (SSB) w/Automatic Link Establishment (ALE) AJ	X			
WF#10	Link 11 / TADIL-A		X		
WF#13	HF ATC Data Link	X			
WF#14	VHF FM Military Tactical	X			
WF#15	VHF for ATC	X			
WF#16	VHF AM ATC	X			
WF#17	VHF/UHF FM LMR	X			
WF#18	VHF ATC Data Link (NEXCOM)	X			
WF#19	UHF AM/FM PSK Military Tactical	X			
WF#20	Link 4A / TADIL-C		X		
WF#22	SATURN (UHF PSK AJ NATO)			X	
WF#23	STANAG 4193 Mode S Level 4/5		X		
WF#27	MUOS-CAI		X		
WF#28	Cellular Radio & PCS				X
WF#29	Link 22 / NILE				X
WF#30	Mobile Satellite Service (MSS)				X
WF#31	Integrated Broadcast Service (IBS) - M		X		
WF#32	Bowman Waveform Family		(VHF)		(HF/ UHF)

TABLE A-4

NOTE: OBJ=Objective

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ANNEX B

MARITIME and FIXED STATION DOMAIN

1. General Description of Operational Capability. No change.

a. Mission Need. Missions Needs Statement Summary. No change.

b. Overall Mission Area. The JTR System components will operate on surface, sub-surface, and fixed station platforms that support the mission areas defined in this ORD.

c. Proposed System. The maritime JTR Sets shall be part of a communications system that provides modular communicating and networking capabilities.

d. Missions to Accomplish. No change.

e. Operational and Support Concepts/Operational Concept/(Supplemental). The JTR System will support the communications and navigation capabilities of platforms throughout their operational deployments. The JTR System equipment will be operated and maintained in accordance with the standard operating procedures for the host platforms that it supports. The maritime JTR Sets shall be interoperable with the Maritime, Submarine Antenna Distribution System, Radio Frequency Distribution and Control System (RFDACS), and the Automated Digital Network System.

f. Benefits of Evolutionary Acquisition. No change.

2. Threat.

a. Threat to be Countered. No change.

b. Projected Threat Environment. No change.

c. System Threat Assessment Report. No change.

3. Shortcomings of Existing Systems and C4ISR. No change.

4. Capabilities Required. No change.

a. System Performance. The JTR System shall meet the following supplemental maritime specific performance parameters:

(1) General Performance Requirements:

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*(a) In addition to GPS and guard capabilities each Maritime and Fixed JTR Set shall provide a scaleable number of channels, up to four channels **(T)**, with a growth capability to ten channels. **(O)**

RATIONALE: Stated channels are deemed sufficient for current and future operations.

(b) Each Maritime JTR Set shall be capable of operating in Sea State 5 and surviving Sea State 8 on all classes of ship **(T)** and to operate at sea states above 5 with minimal degraded performance. **(O)**

RATIONALE: Maritime JTR Sets will operate on platforms that encounter stated conditions.

(c) Each JTR Set shall be standard 19" wide rack mountable. **(T)**

RATIONALE: Maritime/Fixed host platforms are designed for 19" racks.

(d) Each Maritime and Fixed station configuration of JTR Sets shall provide the capability for radios to be operated, controlled, and monitored from remote locations. **(T)**

RATIONALE: Operators will have the option to communicate while physically separated from the JTR Sets.

(e) Each JTR Set shall be compatible with commercial, ground mobile, and shipboard power distributed systems. **(T)**

RATIONALE: The JTR Sets can operate on standard power systems.

(f) Each JTR Set shall draw no more power **(T)** and draw at least 75% less power **(O)** than the equipment it replaces.

RATIONALE: The JTR Sets will operate within current platform power budgets. Reduced power consumption by JTR System will make more power available to other critical systems.

(g) Each JTR Set weight shall not exceed a two- person lift, **(T)** and weigh less than the radio it replaces. **(O)**

RATIONALE: This weight range is deemed acceptable for Maritime/Fixed sets.

(h) Each JTR Set shall have a minimum of 10 presets per channel **(T)** and a minimum of 20 presets per channel. **(O)**

* Specifies maritime requirement for KPP, 4.a.(1)(h).

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RATIONALE: Presets allow operators to quickly change operating frequencies.

(i) Each JTR Set shall provide a standard interface with legacy shipboard and fixed station communication systems. **(T)**

RATIONALE: Standard interface will simplify integration of JTR System operations with current and future systems.

(j) Each Maritime/Fixed Station JTR Set shall provide the capability to choose from among at least 12 waveforms without loading additional software from an external source, and replace waveforms over-the-air or using a bulk storage device containing up to 30 waveforms. **(T)**

RATIONALE: Operators will have options to change operating conditions without need to re-load waveforms in JTR Sets.

(k) Each Maritime/Fixed Station JTR Set shall have the ability to scan a minimum of 100 operator-designated fixed frequencies. **(T)**

(2) Security Performance Parameters. No change.

(3) Networking Performance Parameters. No change.

(4) Network Management. No change.

b. Information Exchange Requirements. No change.

c. Logistics and Readiness. No change.

d. Other Systems Characteristics.

(1) Each JTR Set will be capable of being operated in low light shipboard conditions. **(T)**

RATIONALE: Operators can use JTR sets in host platform environmental conditions.

(2) Temperature constraints shall conform to best commercial practices. **(T)**

RATIONALE: Commercial practice is deemed adequate for maritime/fixed applications of the JTR System.

(3) Adhere to the guidance of applicable Military Standards intended to preclude or minimize exposure to health hazards and threats to warfighter survivability. **(T)**

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RATIONALE: User personnel will not be exposed to unreasonable hazards.

5. Program Support. No change.

a. Maintenance Planning. No change.

b. Support Equipment. The JTR System deployed within USN shall utilize the Consolidated Automated Support System.

c. C4I/Standardization, Interoperability, and Commonality. No change.

d. Information Assurance. No change.

e. Computer Resources. No change.

f. Human Systems Integration. All final manpower, personnel, and training requirements will be documented in Service training plans.

g. Other Logistics Considerations (Supplemental). No change.

h. Transportation and Basing (supplemental). The JTR System components shall be permanently installed on surface ships, submarines, and will be deployed worldwide as an integral component of the respective communications suite. The JTR System will also be permanently installed at a variety of communications facilities ashore. The JTR Sets will not be routinely de-installed from one platform/facility for reinstallation at another location. Actual JTR Set locations and delivery will be in accordance with the priorities established by major command requirements and missions.

i. Geospatial Information and Services (GI&S). No change.

j. Natural Environmental Support. No change.

6. Force Structure. No change.

7. Schedule. No change.

8. Program Affordability.

a. The warfighter is willing to pay the cost of each JTR Set listed in the below Table B-1.

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b. Each channel will operate the waveforms identified in the Maritime/Fixed Domain Requirements Blocking Table.

Maritime/Fixed Affordability Targets

	Threshold	Objective
GPS + 2 Channel	\$250K	\$200K
GPS + 3 Channel	\$375K	\$300K
GPS + 4 Channel	\$500K	\$400K

TABLE B-1

Note: Cost will be adjusted as Acquisition Manager develops CAIV targets.

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	MARITIME/FIXED STATION REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-05	FY-07	
4.a.(1)	SYSTEM PERFORMANCE			
4.a.(1)(a)	System Support of Communications	X		
4.a.(1)(b)	Program Growth Capability (KPP)	X		
4.a.(1)(c)	Software Re/Configuration (KPP)	X		
4.a.(1)(d)	Hardware Re/Configuration	X		
4.a.(1)(d)	Each JTR Set shall have the ability to be reconfigured (hardware software and firmware changes/upgrades) by the operator			X
4.a.(1)(e)	Routing and Retransmission (KPP)	X		
4.a.(1)(e)	Supports Objective Waveforms to be programmable to automatically route and retransmit			X
4.a.(1)(g)	Domain Radio Frequency Operation Range	X		
4.a.(1)(g)	Incorporates military and commercial satellite and terrestrial communications above 2 GHz			X
4.a.(1)(h)	Multi Channel Operation (KPP)	X		
4.a.(1)(i)	Provides Automatic Protocol Conversions and Message Format Conversions between like modes of voice, video, and data	X		
4.a.(1)(j)	Provides Over-The-Air software upgrades	X		
4.a.(1)(k)	Ability to scan a minimum of 10 operator and or network manager designated fixed frequencies or presets per channel	X		
4.a.(1)(k)	Ability to scan individual frequency bands			X
4.a.(1)(l)	Installation Kits and Ancillary Interfaces	X		
4.a.(1)(m)	Power Restoration	X		
4.a.(1)(n)	Standard Interface	X		
4.a.(1)(o)	GPS Channel	X		
4.a.(1)(p)	Integrated GPS Port		X	
4.a.(1)(q)	Support Core Set of Capabilities IAW JTRS ORD Annex D	X		
4.a.(1)(r)	Joint Network Interoperability/IERs for critical Service and Joint (KPP)	X		
4.a.(1)(r)	Provides 100% of top-level IERs with Service, Joint Allied /Coalition and commercial networks as applicable to mission			X
4.a.(1)(s)	Operate at full performance levels and not degrade effectiveness of host systems	X		
4.a.(2)	SECURITY PERFORMANCE			
4.a.(2)(a)	Embedded Programmable Crypto/Benign Fill	X		
4.a.(2)(b)	Multiple Single Levels of Security from Unclassified up to Secret and Top Secret / Sensitive Compartmented Information (TS/SCI) System High	X		
4.a.(2)(b)	Multi-Level Security from Unclassified through Top Secret / Sensitive Compartmented Information (TS/SCI)			X
4.a.(2)(c)	TRANSEC	X		
4.a.(2)(c)	Provide TRANSEC capabilities and specifications for radios/waveforms that may be Incorporated into JTR System Systems in the future			X
4.a.(2)(d)	Electronic Key Management System (EKMS)	X		
4.a.(2)(e)	Over the Air Transfer	X		

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	MARITIME/FIXED STATION REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-05	FY-07	
4.a.(2)(f)	Remote ID and Exclusion	X		
4.a.(2)(g)	Crypto Retention	X		
4.a.(2)(g)	After primary power loss each JTR Set shall be capable of retaining CRYPTO variables up to 144 hrs			X
4.a.(2)(h)	Capable of detecting an unexpected degradation of power and placing itself in a known secure state.		X	
4.a.(2)(i)	Capable of implementing NSA and/or NIST approved public key cryptography	X		
4.a.(2)(j)	Crypto Systems Interface	X		
4.a.(2)(k)	CCI Storage: Each JTR Set capable of being handled as an unclassified Controlled Cryptographic Item (CCI).	X		
4.a.(2)(k)	When zeroized, each JTR Set shall be capable of being handled as unclassified non-CCI material by employing technology approved by NSA which minimizes or eliminates risk of exploitation of the embedded device that provides security			X
4.a.(2)(l)	Zeroization	X		
4.a.(2)(m)	Capability for the operator and network manager to zeroize all channels in the JTR Set and to selectively zeroize individual channels	X		
4.a.(2)(n)	Each JTR Set shall feature a tamper detection capability	X		
4.a.(2)(o)	Defense Information Infrastructure (DII)/Common Operating Environment Key Management	X		
4.a.(3)	NETWORK PERFORMANCE			
4.a.(3)(a)	Provides scaleable networking services for connected RF networks, host, and hybrid networks for Maritime/Fixed Domain			X
4.a.(3)(b)	Network Extension/Coverage (KPP)	X		
4.a.(3)(c)	Scaled Communications	X		
4.a.(3)(d)	Mobile Users	X		
4.a.(3)(e)	Routing	X		
4.a.(3)(e)	The network JTR System shall provide routing capability, interface connectivity that extends into cellular radio networks		X	
4.a.(3)(f)	Dynamic Routing	X		
4.a.(3)(g)	Provide hardware/software and routing mechanisms to provide routing connectivity between different networks	X		
4.a.(3)(h)	Situational Awareness	X		
4.a.(3)(i)	Network Throughput and Latency	X		
4.a.(3)(i)	Provide increase information flow through the addition of new waveforms and/or protocols			X
4.a.(3)(j)	JTR System Network Supports a Name-To-Address Translation Service	X		
4.a.(3)(k)	Supports the capability for users to address data to other users by using position/organization names in the address field	X		
4.a.(3)(l)	The JTR System shall provide the means to support message delivery based on geographic area			X
4.a.(3)(m)	System Reconfiguration of a network of 150 JTR Sets within 15 minutes	X		
4.a.(3)(m)	System Reconfigure of a network of 150 JTR Sets within 5 minutes			X
4.a.(3)(n)	Asymmetric Networking	X		

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	MARITIME/FIXED STATION REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-05	FY-07	
4.a.(4)	NETWORK MANAGEMENT			
4.a.(4)(a)	Interoperate with Joint Network Management Tools	X		
4.a.(4)(b)	Remotely Identify and Configure User Access	X		
4.a.(4)(c)	Status Reporting	X		
4.a.(5)	SPECTRUM MANAGEMENT			
4.a.(5)(a)	Report to Spectrum Management Systems	X		
4.a.(5)(b)	Spectrum Management of JTR System Waveforms	X		
4.a.(5)(c)	Automatic Selection of Frequency		X	
4.a.(5)(d)	Dynamic Frequency Management/Allocation		X	
4.c.	LOGISTICS AND READINESS			
4.c.(1)	Channel Operational Availability A(o) of 0.96 (KPP)	X		
4.c.(1)	Channel Operational Availability A(o) of 0.99 (KPP)			X
4.c.(2)	JTR Set hardware size and weight be compatible with specifications in domain annexes	X		
4.c.(3)	Logistically Supportable Within Each Service	X		
4.c.(4)	Built-In-Test; capable of fault isolation to LRU	X		
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)	Listening Silence	X		
4.d.(1)	Listening Silence and provide protection against hostile detection by non-radio means			X
4.d.(2)	Electronic Warfare Survivable	X		
4.d.(3)	LPI/LPD/LPE Techniques		X	
4.d.(4)	Elimination of all Electromagnetic Environmental Effects	X		
4.d.(5)	The JTR System shall survive the effects of Electrostatic Discharge (ESD) and Lightning Effects	X		
4.d.(6)	The JTR System shall meet applicable NSA emanation standards, including TEMPEST.	X		
4.d.(7)	Capable of being operated, maintained, and decontaminated in a biological, and chemical environment	X		
4.d.(7)	Capable of being operated, maintained, and decontaminated in a nuclear environment		X	
4.d.(8)	Human Computer Interfaces	X		
4.d.(8)	Human Computer Interfaces and maintain consistency between JTR Set versions			X
4.d.(9)	Incorporates Power Management	X		
4.d.(10)	Withstanding Voltage Surges and have Energy Dissipation Capacity	X		
4.d.(11)	Spectrum Management Policy/Global Operations	X		
4.d.(12)	Employ protective measures against EMP and directed energy threats			X
4.d.(13)	Employ efficient bandwidth utilization to include data compression			X
4.d.(14)	Provide for Future Narrowband Digital Terminal signaling protocols inclusion to the system			X
4.d.(15)	Point-to-point and Conference Call Capability		X	
4.d.(16)	Information Integrity	X		
4.d.(17)	Quality of Service	X		
8.c	COST AS AN INDEPENDENT VARIABLE (CAIV)			

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	MARITIME/FIXED STATION REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-05	FY-07	
8.c	Cost as an Independent Variable (CAIV)	X		
8.c.	Cost as an Independent Variable with an objective to reduce initial costs by 50 percent			X
	ANNEX B			
4.a.(1)	MARITIME/FIXED STATION SYSTEM PERFORMANCE			
4.a.(1)(a)	In addition to GPS each Maritime and Fixed JTR Set shall provide scaleable number of channels up to four channels	X		
4.a.(1)(a)	In addition to GPS each Maritime and Fixed JTR Set shall provide scaleable number of channels up to 10 channels			X
4.a.(1)(b)	Each JTR Set shall be capable of operating in Sea State 5 and surviving Sea State 8 on all classes of ship	X		
4.a.(1)(b)	Each JTR Set shall be capable of operating at Sea States above 5 with minimal degraded performance			X
4.a.(1)(c)	Each JTR Set shall be standard 19" wide rack mountable	X		
4.a.(1)(d)	Each JTR Set shall provide the capability for radios to be operated, controlled, and monitored from remote locations	X		
4.a.(1)(e)	Each JTR Set shall be compatible with commercial, ground mobile, and shipboard power distribution systems.	X		
4.a.(1)(f)	Each JTR Set shall draw no more power than the equipment it replaces	X		
4.a.(1)(f)	Each JTR Set shall draw at least 75% less power than the equipment it replaces			X
4.a.(1)(g)	Each JTR Set weight shall not exceed a two-person lift	X		
4.a.(1)(g)	Each JTR Set weight shall not exceed a two-person lift and weigh less than the radio it replaces			X
4.a.(1)(h)	Each JTR Set shall have a minimum of 10 presets per channel	X		
4.a.(1)(h)	Each JTR Set shall have a minimum of 20 presets per channel			X
4.a.(1)(i)	Each JTR Set shall provide a standard interface with legacy shipboard and fixed station communication systems	X		
4.a.(1)(j)	Each Maritime/Fixed Station JTR Set shall provide the capability to choose from among at least 12 waveforms without loading additional software from an external source and replace over-the-air or using a bulk storage device containing up to 30 waveforms	X		
4.a.(1)(k)	Each JTR Set shall have the ability to scan a minimum of 100 operator-designated fixed frequencies	X		
4.d.(1)	Each JTR Set will be capable of being operated in low light shipboard conditions		X	
4.d.(2)	Temperature constraints shall conform to best commercial practices	X		
4.d.(3)	Adhere to guidance of applicable Military Standards intended to preclude or minimize exposure to health hazards and threats to warfighter survivability	X		

TABLE B-2

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	MARITIME/FIXED STATION DOMAIN SUPPORTED WAVEFORMS	FY-05	FY-07	OBJ
WF#1	*SINCGARS ESIP (VHF-FM Military Tactical AJ)	X		
WF#2	*HAVE QUICK II (UHF-AM/FM/PSK Military Tactical AJ)	X		
WF#3	*UHF SATCOM Military (181-182-183 DAMA)	X		
WF#4	*Enhanced Position Location Reporting System (EPLRS)		X	
WF#5	*Wideband Networking Waveform (WNW)		X	
WF#6	*Link 16 / TADIL-J		X	
WF#7	UHF SATCOM Military Protocol (184)	X		
WF#8	HF Independent Side Band (ISB) w/Automatic Link Establishment (ALE)	X		
WF#9	HF Single Side Band (SSB) w/Automatic Link Establishment (ALE) (AJ)	X		
WF#10	Link 11 / TADIL-A	X		
WF#11	STANAG 5066 (HF Message Protocol)	X		
WF#12	STANAG 4529 (HF NB Modem)	X		
WF#13	HF ATC Data Link		X	
WF#14	VHF FM Military Tactical	X		
WF#15	VHF for ATC		X	
WF#16	VHF AM ATC	X		
WF#17	VHF/UHF FM LMR		X	
WF#18	VHF ATC Data Link (NEXCOM)		X	
WF#19	UHF AM/FM PSK Military Tactical	X		
WF#20	Link 4A / TADIL-C		X	
WF#21	Link 11B / TADIL-B	X		
WF#22	SATURN (UHF PSK AJ NATO)		X	
WF#23	STANAG 4193 Mode S Level 4/5		X	
WF#24	Digital Wideband Transmission System (DWTS) (UHF PSK WB LOS)		X	
WF#27	MUOS-CAI		X	
WF#29	Link 22 / NILE		X	
WF#30	Mobile Satellite Service (MSS)			X
WF#31	Integrated Broadcast Service (IBS) - M		X	
WF#32	Bowman Waveform Family		(VHF)	(HF/ UHF)

TABLE B-3

NOTE: OBJ=Objective

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ANNEX C

GROUND DOMAIN

1. General Description of Operational Capability. No change.

a. Mission Need. Mission Needs Statement Summary. No change.

b. Overall Mission Area. The JTR System will operate in the ground mobile environment and will provide users with access to the Joint networks. The JTR System ground domain family will accommodate small form fit, hand-held, man pack, and vehicular applications. Future concepts under consideration are to use the potential of communicating platforms to sense local data and transmit the data to contribute to a centrally managed information database. For example, potential applications could include using radios as sensors for mission areas such as SIGINT.

c. Proposed System. The ground family of JTR Sets will provide transportable and scaleable, position location, and networking capabilities.

d. Missions to Accomplish. No change.

e. Operational and Support Concept/Operational Concept (Supplemental). The Services that operate in the ground domain are transforming. The emerging operational concept for the US Marine Corps is "Expeditionary Maneuver Warfare (EMW)." The Army is transforming to an "Objective Force."

The Objective Force is the Army's future full spectrum force: organized, manned, equipped and trained to be more strategically responsive, deployable, agile, versatile, lethal, survivable and sustainable across the entire spectrum of military operations from Major Theater Wars through counter terrorism to Homeland Security. Objective Force units will conduct operational maneuver from strategic distances, creating diverse manifold dilemmas for our adversaries by arriving at multiple points of entry, improved and unimproved.

As necessary, Objective Force units conduct forcible entry, overwhelm aggressor anti-access capabilities, and rapidly impose our will on our opponents. In this manner, Objective Force units arrive immediately capable of conducting simultaneous, distributed and continuous combined arms, air-ground operations, day and night in open, close, complex, and all other terrain conditions throughout the battlespace. Army units conducting joint and combined operations will *see first, understand first, act first and finish decisively* at the strategic, operational, and tactical levels of operation.

In support of ground domain warfighting concepts, platforms will be designed in an arrangement of system-of-systems to support Joint Doctrine, Organization, Training, Materiel, Leadership/Education, Personnel and Facilities (DOTMLPF) that will enable decisive maneuver, horizontal and vertical, day

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and night, in all terrain and weather conditions. These breakthroughs will give Objective Force units the lethality and survivability needed to deliver full spectrum dominance, the versatility to change patterns of operation faster than the enemy can respond, and the agility to adjust to enemy changes of operation faster than he can exploit them. Advanced technologies empower warfighters to achieve situational dominance, creating a powerful construct for the use of force.

(1) **Global Information Grid (GIG).** The GIG is a globally interconnected, end-to-end set of information capabilities, associated processes, and personnel for collecting, processing, storing, disseminating and managing information on demand to warfighters, policy makers, and support personnel. As a component of the Global Information Grid, the JTR System will support the communications and navigation capabilities of platforms throughout their operational deployments. The JTR System will perform certain aspects of communications transport and network operations functions within the GIG. The JTR System will provide access to all GIG networks and services either directly, or via the Warfighter Information Network-Tactical (WIN-T) or other networks for higher capacity access. The following subparagraphs describe the JTR System operational role in the context of the functions of the GIG.

(a) **Communications Transport.** The GIG communications transport function is defined as end-to-end movement of data, information, and/or knowledge between users and producers. Within its intended mission area and organizational assignment the JTR System will execute all aspects of the transport function as applicable to the JTR sub-networks (e.g. EPLRS, SINCGARS, etc.) and the interaction between the sub-networks. The interconnecting of all networks and sub-networks within the GIG will be seamless and transparent to the warfighter, appearing as “one network.”

(b) **Network Operations.** The GIG network operations function is defined as an organizational and procedural framework for integrating network management, information dissemination management and information assurance.

(1) **Network Management.** The GIG network management is defined as the capability to monitor, control and ensure the visibility of the various networking and internetworking components. In initial JTR System implementation, certain sub-network management functions for the Wideband Networking Waveform (WNW) may be performed within the JTR System. These functions will be performed by existing organizations and procedures to the maximum practical extent. Any unique WNW management functionality will be compatible with and portable to the organizational and procedural framework of the Joint Network Management System (JNMS) and its Service elements. The legacy radio networks to be subsumed by the JTR network will be managed by organizations and procedures that are in place for those legacy systems. Objectively, the JNMS and its Service sub-elements will perform as an integrated network management procedural framework for the JTR System and other networks within the GIG.

(2) **Information Dissemination Management (IDM).** The GIG defines Information Dissemination Management (IDM) as the capability achieved with a family of applications,

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processes, and services to provide awareness, access, and delivery of information by the most effective and efficient means in a manner consistent with a commander's policy. Warfighter platforms that require communications within the JTR System frequency spectrum will be served by a single set of JTR System Software Communications Architecture (SCA) compliant components configured for the appropriate number of independent channels to meet the platform requirements. This JTR Set is the entry point to the JTR System inter-network and thus to the WIN-T and GIG. Subject to policy, access to the GIG through the JTR network is provided to any warfighter equipped with a JTR Set or with a legacy radio that is to be subsumed by JTR System. The platform operating application (person, computer, weapon, etc) presents voice, video, or data messages with addressing data to the connected JTR Set. The JTR network then routes and bridges between and among its components (JTR Sets) to deliver the messages to the addressees. Interconnection of JTR System sub-networks and other networks is to be attained by JTR Sets co-located with communications assemblages of other networks, such as WIN-T. The JTR System will provide the means to deliver information throughout the JTR System network by the most effective and efficient means.

(c) **Information Assurance (IA).** The GIG defines IA as information operations to protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. This includes providing for the restoration of information systems by incorporating protection, detection, and reaction capabilities. Within the JTR network, the JTR System will maintain and protect the integrity of submissions from the originating applications and deliver all submissions in original form and content to the destination applications. Likewise, the JTR System will maintain and protect the integrity of submissions to the JTR network from other networks.

(2) **JTR System Ground Configurations.** The JTR System ground domain family will range from a 1 or 2-channel small form fit set to a 1 or 2-channel hand-held set, to a 2-channel man pack set, and to a 6-channel vehicular version. The different versions, numbers of channels and available waveforms will provide the Warfighter with greater flexibility and communications opportunities through seamless on-the-move capabilities. For example, a Warfighter using a 4-channel vehicular version could receive data on one channel, talk on another channel, transmit pictures on a third channel, while monitoring a fourth - simultaneously. A Warfighter using a threshold small form fit and hand-held 1 or 2-channel set loaded with 2 and 6 waveforms respectively will be able to operate in a simple push-to-talk broadcast mode voice network (with, for example, the SINCGARS waveform), and simultaneously exchange data with a distant terminal using satellite as a relay (with the MUOS waveform). Waveforms for the hand-held version will enable the device to operate as a wireless telephone, with a discrete address (global host name/telephone number), and the capability for a mobile user to automatically connect to the WIN-T or other networks without having to reconfigure his/her set. The JTR Sets loaded with this common waveform would function as an automatic relay for this "cellular" system to provide area coverage and range extension. The wideband networking waveform for the hand-held version would enable the establishment of video teleconferences or transmission of imagery.

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(3) **JTR System Waveform Support Concept.** Software media for loading/configuring waveform capabilities into the various JTR Sets will be maintained at the lowest organizational entities that are deemed most effective for each mission capability package. For example, the Army may retain a complete waveform software library at battalion level and distribute waveform sub-sets to company and or individual warfighters for operator configuration and/or reconfiguration of waveform capabilities.

f. Benefits of Evolutionary Acquisition. No change.

2. Threat. No change.

a. Threat to be Countered. No change.

b. Projected Threat Environment. No change.

c. System Threat Assessment Report (STAR). No change.

3. Shortcomings of Existing Systems and C4ISR. No change.

4. Capabilities Required. All ground domain requirements for the JTR System, listed below, shall be based on validated rules for Operational Facilities (OPFACs) and validated Information Exchange Requirements (IERs), between OPFACs contained in the US Army Training and Doctrine Command (TRADOC) Army Architecture Repository Management System (AARMS), or Service/Joint equivalent.

a. System Performance.

(1) General Performance Requirements: Unless specifically stated otherwise, the following requirements refer to the four versions.

(a) The Ground domain encompasses four operational configurations: Small form fit, hand-held, man pack, and vehicular. **(T)**

(b) The vehicular (includes dismountable) configurations of the JTR System shall provide the capability for each JTR Set to be securely operated and controlled from remote locations up to 1.5-km away **(T)** and 4-km. **(O)**

RATIONALE: Remote operation allows operators to perform missions from protected areas while emitting radios can be exposed for optimal communications citing.

(c) Each JTR Set except the small form fit shall provide a display of current own position location information at each Set. **(T)**

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RATIONALE: This will allow an operator to locate himself and navigate, whether or not visual media is available or operational.

(d) Each JTR Set that has an embedded GPS shall provide the GPS capability that is operator selectable to display JTR Set position modes expressed in both the latitude-longitude and in the Military Grid Reference System (MGRS). The MGRS position displays will include a 3-character grid zone, a 2-character 100km square, and a 10-digit map coordinate. **(T)**

RATIONALE: Operators will be able to select the mode to best support the function(s) needed. For example, personnel use the MGRS while some automated systems use latitude and longitude.

(e) Each JTR Set shall have the capability for operators to manually load JTR Set time and the capability to receive over-the-air network timing. **(T)**

RATIONALE: In the event of GPS failure or drifting of radio's internal clock the operator can enter time (e.g., wrist watch time) to allow their radios to synchronize into selected JTR System supported radio networks.

(f) The ground domain JTR System shall provide the capability to choose from among at least 2 waveforms in the small form fit, at least 6 waveforms in the hand-held, and at least 10 waveforms in the man pack warfighter and vehicular configurations without loading additional software from an external source, and replace waveforms over-the-air or using a bulk storage device containing up to 30 waveforms. **(T)**

RATIONALE: The stated capabilities are deemed sufficient for JTR System to perform current and future missions.

(g) The ground domain JTR Set shall provide the capability to communicate in urban terrain and through subterranean complexes. **(T)**

RATIONALE: This capability supports the warfighter's ability to operate in complex urban terrain and subterranean environments (e.g., tunnels, subway systems, caves, sewer systems, etc).

(2) Security Performance Parameters.

(a) Implementations of the small form fit JTR Set that only require the use of an unclassified crypto algorithm (s) for COMSEC or TRANSEC, and unclassified key (e.g., they will not process classified information), shall be capable of being handled as UNCLASSIFIED (non-CCI). **(T)**

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RATIONALE: Certain implementations of the Small Form Fit radio will be embedded in unattended sensors and munitions and subjected to high risk environments making them susceptible to loss or capture.

(3) Networking Performance Parameters. No change.

(4) Network Management. No change.

b. Information Exchange Requirements (IER). No change.

c. Logistics and Readiness. The JTR System components shall be transportable worldwide (air, rail, sea, and air droppable). **(T)**

RATIONALE: The JTR System is to be wholly transportable on host platforms and will undergo the same environmental conditions of the hosts.

d. Other System Characteristics.

(1) Physical Integration into User Platforms: Integration of JTR Sets into user platforms shall be accomplished with minimal demands for platform modifications.

(a) Each vehicular JTR Set shall be smaller than the equipment that it replaces **(T)** and be 75% smaller **(O)** than the equipment that it replaces.

RATIONALE: The size of the JTR Set will not exceed the size of legacy radio equivalents for the waveforms operating in the JTR Set.

(b) Each one channel hand-held JTR Set, including the ancillary equipment, shall be no larger than the size of a comparable existing land mobile radio sets. **(T)**

(c) Each two channel hand-held JTR Set, including the ancillary equipment, shall be no larger than the size of a comparable two-channel hand-held land mobile radio or two existing one channel hand-held land mobile radio sets. **(T)**

(d) Each hand-held JTR Set shall be no more than 2 pounds (one channel) and no more than 3 pounds (two channels) **(T)** and one pound. **(O)**

RATIONALE: Reduced size and weight of the hand-held JTR Set will contribute to greater flexibility, increased space and weight allowed for primary mission equipment (e.g., load bearing equipment (LBE)) for the individual warfighters.

(e) Each hand-held JTR Set shall utilize voice activation/control technology. **(T)**

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RATIONALE: Individual warfighters will require hands free operation when handheld sets are used. This will allow warfighters to mounted/attached handheld devices to their load bearing equipment thus allowing hands free operation during critical missions.

(f) Each hand-held JTR Set shall have a minimum transmit/receive range of 5KM (T) and 15KM (O).

RATIONALE: The transmit/receive range is required to support warfighters dismounted operations.

(g) Each small form fit JTR Set being integrated into warfighters load bearing equipment shall not exceed 40 cubic inches for a 1-channel set without GPS, 50 cubic inches for a 1-channel set with GPS and guard capabilities, 80 cubic inches for a 1-channel set with a 20 watt power amplifier, 70 cubic inches for a 2-channel set without GPS and guard capabilities, 80 cubic inches for a 2-channel set (T) and 20 cubic inches for a 1-channel, and 40 cubic inches for a 2-channel set. (O)

RATIONALE: Individual warfighters and unattended ground sensor systems are compact and lightweight and require equally compact and lightweight communications components. Unattended ground platforms can include munitions and sensor fields in remote or isolated areas beyond line-of-sight from info-sphere assets.

(h) Each small form fit JTR Set integrated into emerging individual warfighters equipment shall be compatible with voice activation/control technology. (T)

RATIONALE: Individual warfighters will require hands free operation when small form fit JTR sets are integrated into the warfighters equipment (e.g., integrated into warfighters load bearing equipment, head gear, etc.).

(i) Each small form fit JTR Set being integrated into warfighters load bearing equipment shall be no more than 1.2 pounds for a 1-channel set, 1.6 pounds for a 1-channel set with GPS and guard capabilities, 2.2 pounds for a 2-channel set without GPS and 2.6 pounds for a two channel set with GPS and guard capabilities (T) and 1 pound for a 1-channel set, 2 pounds for a 2-channel set. (O)

RATIONALE: Reduced size and weight of the small form fit JTR Set will contribute to greater flexibility, increased space, and weight allowed for primary mission equipment (e.g., load bearing equipment (LBE)) for the individual warfighters.

(j) Each small form fit JTR Set shall not exceed 25 percent of the sensor payload total weight.

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RATIONALE: Reduced size and weight of the small form fit (sensor) JTR Set will contribute to greater flexibility, increased space, and weight allowed for primary mission equipment (e.g., sensor system equipment).

(k) Each small form fit JTR Set shall be capable of communicating in a network sensor communications grid of at least 15KM **(T)** and 30 KM **(O)** area of operations.

RATIONALE: The transmit/receive range is required to support warfighters dismounted operations.

(l) Each man pack JTR Set, including the ancillary equipment, shall not exceed 400 cubic inches **(T)** or 200 cubic inches. **(O)**

(m) Each man pack JTR Set shall not exceed 9 pounds **(T)** and not exceed 6 pounds. **(O)**

(n) Each vehicular JTR Set shall weigh less than the equipment that it replaces **(T)** and weigh 75% less **(O)** than the equipment that it replaces.

RATIONALE: Reduced size and weight of JTR System components will contribute to increased space and weight allowed for primary mission equipment on the platforms.

(o) Each JTR Set shall survive High Altitude Electromagnetic Pulse (HEMP) to the degree specified in MIL-STD-2169B but not be required to work through the event. **(T)**

RATIONALE: The JTR System is a mission critical system and unless protected from HEMP, the electronic circuitry of JTR System components will be susceptible to widespread and permanent destruction during a HEMP event. Recycling of power to restore operation is acceptable.

(p) Each JTR Set shall be capable of being operated and maintained in a nuclear, biological, and chemical (NBC) environment by persons in full Mission Oriented Protective Posture IV (MOPP IV) protection gear. **(T)**

RATIONALE: After chemical or biological attacks, the users will be able to de-contaminate and restore the JTR Set functionality.

(2) Power requirements:

(a) Each JTR Set shall draw no more primary power than the equipment replaced **(T)** and draw at least 75% less power than the equipment replaced. **(O)**

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(b) Each JTR Set shall be capable of being operated with primary power, within its full DC operating range, derived from rechargeable batteries, host system batteries and host system DC power **(T)**, and from national, host national AC power systems, and from new power systems **(O)** as they evolve.

RATIONALE: Reduced power needed for the JTR System contributes to availability of power for primary missions. Use of rechargeable batteries reduces operating and maintenance costs.

* (3) Channel requirements:

(a) In addition to GPS and guard capabilities, each vehicular JTR Set shall be scaleable for up to six channels **(T)** and up to eight channels. **(O)**

RATIONALE: Stated channel requirements are deemed sufficient to meet current and future mission needs.

(b) In addition to GPS and guard capabilities, each man pack JTR Set shall be scaleable for up to two channels **(T)** and up to four channels. **(O)**

RATIONALE: Stated channel requirements are deemed sufficient to meet current and future mission needs.

(c) In addition to GPS and guard capabilities, the hand-held JTR Set shall include capabilities for operating: One channel **(T)** and two channels **(O)** for Block 1; and two channels **(T)** and three channels **(O)** for Block 2.

RATIONALE: Stated channel requirements are deemed sufficient to meet current and future mission needs. The underlying requirement for two channel capabilities is for non-contentious voice and data capabilities. During the transition to the JTR System, this may require a hand-held JTR Set to operate on two separate channels in two separate networks.

(d) The small form fit JTR Set shall include capabilities for operating: one channel without GPS and guard capabilities and one channel with GPS and guard capabilities **(T)** Block 1, and two channels without GPS and guard capabilities and two channels with GPS and guard capabilities **(T)** Block 2, and three channels with GPS and guard capabilities. **(O)**

RATIONALE: Stated channel requirements are deemed sufficient to meet current and future mission needs. The underlying requirement for two channel capabilities is for non-contentious voice and data capabilities. During the transition to the JTR System, this may require a small form fit JTR Set to operate on two separate channels in two separate networks.^E

^E * 4.d(3) (a, b, c, d) Specifies ground requirements for KPP, 4.a.(1)(h).

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(4) As applicable each JTR Set shall provide capability to access auxiliary voice/video/data on each channel. **(T)**

RATIONALE: Allows access to off-line databases.

(5) Personnel Health and Safety. Each JTR Set shall:

(a) Provide for safe, efficient and effective operation and maintenance by normal and typically trained personnel while wearing any combination of night vision devices, MOPP IV gear, and cold weather protective gear. **(T)**

RATIONALE: The JTR System components will be operated and maintained by typical warfighters under all environmental conditions.

(b) Adhere to the guidance of applicable Civilian and Military Standards intended to preclude or minimize exposure to health hazards and threats to warfighters survivability. **(T)**

RATIONALE: User personnel will not be exposed to unreasonable hazards.

5. Program Support.

a. Maintenance Planning. No change.

b. Support Equipment. No change.

c. C4I/Standardization, Interoperability, and Commonality. No change.

d. Information Assurance. No change.

e. Computer Resources. No change.

f. Human Systems Integration. All final manpower, personnel, and training (MPT) requirements will be documented in Service training plans.

g. Other Logistics Considerations. No change.

h. Transportation and Basing. No change.

i. Geospatial Information and Services (GI&S). No change.

j. Natural Environmental Support. No change.

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6. Force Structure. No change.

7. Schedule. No change.

8. Program Affordability.

a. The warfighter is willing to pay the cost of each JTR Set listed in the below Tables C1-C4.

b. Each channel will operate the waveforms identified in the Ground Domain Requirements Blocking Table. The Link 16 capability will increase the cost an additional \$60K.

c. Initial fielding of the JTR System will be to users with *new* wideband data radio requirements not currently satisfied. But as these users receive their JTR System, the functionality formerly provided by their legacy radios is now provided on channels on their JTR System, and the legacy radios are then available for redistribution to the next users on the priority list for those legacy radios.

Vehicular Affordability Targets

	Threshold	Objective
GPS + 2 Channel	\$47K	\$23.5K
GPS + 3 Channel	\$60K	\$30K
GPS + 4 Channel	\$69K	\$34.5K
GPS + 5 Channel	\$97K	\$48.5K
GPS + 6 Channel	\$105K	\$52.5K

TABLE C-1

Handheld Affordability Targets

	Threshold	Objective
GPS + 1 Channel	\$9K	\$4K
GPS + 2 Channel	\$10K	\$5K

TABLE C-2

Note: Cost will be adjusted as Acquisition Manager develops CAIV targets.

Man Pack Affordability Targets

	Threshold	Objective
GPS + 2 Channel	TBD	TBD

TABLE C-3

Note: Cost will be adjusted as Acquisition Manager develops CAIV targets.

Small Form Fit Affordability Targets

	Threshold	Objective
1 Channel w/Type III Encryption	TBD	TBD

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1 Channel	\$9.1K	\$7.5K
GPS + 1 Channel	\$10.1K	\$8.5K
GPS + 2 Channel	\$15.4K	\$12.7K

TABLE C-4

Note: Cost will be adjusted as Acquisition Manager develops CAIV targets.

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	GROUND DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.a.(1)	SYSTEM PERFORMANCE			
4.a.(1)(a)	System Support of Communications	X		
4.a.(1)(b)	Program Growth Capability (KPP)	X		
4.a.(1)(c)	Software Re/Configuration (KPP)	X		
4.a.(1)(d)	Hardware Re/Configuration	X		
4.a.(1)(d)	Each JTR Set shall have the ability to be reconfigured (hardware software and firmware changes/upgrades) by the operator			X
4.a.(1)(e)	Routing and Retransmission (KPP)	X		
4.a.(1)(e)	Supports Objective Waveforms to be programmable to automatically route and retransmit			X
4.a.(1)(g)	Domain Radio Frequency Operation Range	X		
4.a.(1)(g)	Incorporates military and commercial satellite and terrestrial communications above 2 GHz			X
4.a.(1)(h)	Multi Channel Operation (KPP)	X		
4.a.(1)(i)	Provides Automatic Protocol Conversions and Message Format Conversions between like modes of voice, video, and data	X		
4.a.(1)(j)	Provides Over-The-Air software upgrades	X		
4.a.(1)(k)	Ability to scan a minimum of 10 operator and or network manager designated fixed frequencies or presets per channel	X		
4.a.(1)(k)	Ability to scan individual frequency bands			X
4.a.(1)(l)	Installation Kits and Ancillary Interfaces	X		
4.a.(1)(m)	Power Restoration	X		
4.a.(1)(n)	Standard Interface	X		
4.a.(1)(o)	GPS Channel	X		
4.a.(1)(p)	Integrated GPS Port		X	
4.a.(1)(q)	Support Core Set of Capabilities IAW JTRS ORD Annex D	X		
4.a.(1)(r)	Joint Network Interoperability/IERs for critical Service and Joint (KPP)	X		
4.a.(1)(r)	Provides 100% of top-level IERs with Service, Joint Allied /Coalition and commercial networks as applicable to mission			X
4.a.(1)(s)	Operate at full performance levels and not degrade effectiveness of host systems	X		
4.a.(2)	SECURITY PERFORMANCE			
4.a.(2)(a)	Embedded Programmable Crypto	X		
4.a.(2)(b)	Multiple Single Levels of Security from Unclassified up to Secret and Top Secret / Sensitive Compartmented Information (TS/SCI) System High	X		
4.a.(2)(b)	Multi-Level Security from Unclassified through Top Secret / Sensitive Compartmented Information (TS/SCI)			X
4.a.(2)(c)	TRANSEC	X		
4.a.(2)(c)	Provide TRANSEC capabilities and specifications for radios/waveforms that may be Incorporated into JTR System Systems in the future			X
4.a.(2)(d)	Electronic Key Management System (EKMS)	X		
4.a.(2)(e)	Over the Air Transfer	X		

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	GROUND DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.a.(2)(f)	Remote ID and Exclusion	X		
4.a.(2)(g)	Crypto Retention at least 96 hours	X		
4.a.(2)(g)	After primary power loss each JTR Set shall be capable of retaining Crypto variables up to 144 hrs			X
4.a.(2)(h)	Capable of detecting an unexpected degradation of power and placing itself in a known secure state.		X	
4.a.(2)(i)	Capable of implementing NSA and/or NIST approved public key cryptography	X		
4.a.(2)(j)	Crypto Systems Interface	X		
4.a.(2)(k)	CCI Storage: Each JTR Set capable of being handled as an unclassified Controlled Cryptographic Item (CCI).	X		
4.a.(2)(k)	When zeroized, each JTR Set shall be capable of being handled as unclassified non-CCI material by employing technology approved by NSA which minimizes or eliminates risk of exploitation of the embedded device that provides security			X
4.a.(2)(l)	Zeroization	X		
4.a.(2)(m)	Capability for the operator and network manager to zeroize all channels in the JTR Set and to selectively zeroize individual channels	X		
4.a.(2)(n)	Each JTR Set shall feature a tamper detection capability	X		
4.a.(2)(o)	Defense Information Infrastructure (DII)/Common Operating Environment Key Management	X		
4.a.(3)	NETWORK PERFORMANCE			
4.a.(3)(a)	Scaleable Networking (KPP)	X		
4.a.(3)(b)	Network Extension/Coverage (KPP)	X		
4.a.(3)(c)	Scaled Communications	X		
4.a.(3)(d)	Mobile Users	V,M	HH,SFF	
4.a.(3)(e)	Routing	X		
4.a.(3)(e)	The network JTR System shall provide routing capability, interface connectivity that extends into cellular radio networks		X	
4.a.(3)(f)	Dynamic Routing	X		
4.a.(3)(g)	Provide hardware/software and routing mechanisms to provide routing connectivity between different networks	V,M	HH,SFF	
4.a.(3)(h)	Situational Awareness	V,M	HH,SFF	
4.a.(3)(i)	Network Throughput and Latency	X		
4.a.(3)(i)	Provide increase information flow through the addition of new waveforms and/or protocols			X
4.a.(3)(j)	JTR System Network Supports a Name-To-Address Translation Service	X		
4.a.(3)(k)	Supports the capability for users to address data to other users by using position/organization names in the address field	X		
4.a.(3)(l)	The JTR System shall provide the means to support message delivery based on geographic area			X
4.a.(3)(m)	System Reconfiguration of a network of 150 JTR Sets within 15 minutes	V,M	HH,SFF	
4.a.(3)(m)	System Reconfigure of a network of 150 JTR Sets within 5 minutes			X
4.a.(3)(n)	Asymmetric Networking	V,M	HH,SFF	
4.a.(4)	NETWORK MANAGEMENT			

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	GROUND DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.a.(4)(a)	Interoperate with Joint Network Management Tools	X		
4.a.(4)(b)	Remotely Identify and Configure User Access	V,M	HH,SFF	
4.a.(4)(c)	Status Reporting	X		
4.a.(5)	SPECTRUM MANAGEMENT			
4.a.(5)(a)	Report to Spectrum Management Systems	X		
4.a.(5)(b)	Spectrum Management of JTR System Waveforms	X		
4.a.(5)(c)	Automatic Selection of Frequency		X	
4.a.(5)(d)	Dynamic Frequency Management/Allocation		X	
4.c.	LOGISTICS AND READINESS			
4.c.(1)	Channel Operational Availability A(o) of 0.96 (KPP)	X		
4.c.(1)	Channel Operational Availability A(o) of 0.99 (KPP)			X
4.c.(2)	JTR Set hardware size and weight be compatible with specifications in domain annexes	X		
4.c.(3)	Logistically Supportable Within Each Service	X		
4.c.(4)	Built-In-Test; capable of fault isolation to LRU	X		
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)	Listening Silence	X		
4.d.(1)	Listening Silence and provide protection against hostile detection by non-radio means			X
4.d.(2)	Electronic Warfare Survivable	X		
4.d.(3)	LPI/LPD/LPE Techniques		X	
4.d.(4)	Elimination of all Electromagnetic Environmental Effects	X		
4.d.(5)	The JTR System shall survive the effects of Electrostatic Discharge (ESD) and Lightning Effects	X		
4.d.(6)	The JTR System shall meet applicable NSA emanation standards, including TEMPEST.	X		
4.d.(7)	Capable of being operated, maintained, and decontaminated in a biological, and chemical environment	X		
4.d.(7)	Capable of being operated, maintained, and decontaminated in a nuclear environment		X	
4.d.(8)	Human Computer Interfaces	X		
4.d.(8)	Human Computer Interfaces and maintain consistency between JTR Set versions			X
4.d.(9)	Incorporates Power Management	X		
4.d.(10)	Withstanding Voltage Surges and have Energy Dissipation Capacity	X		
4.d.(11)	Spectrum Management Policy/Global Operations	X		
4.d.(12)	Employ protective measures against EMP and directed energy threats			X
4.d.(13)	Employ efficient bandwidth utilization to include data compression			X
4.d.(14)	Provide for Future Narrowband Digital Terminal signaling protocols inclusion to the system			X
4.d.(15)	Point-to-point and Conference Call Capability		X	
4.d.(16)	Information Integrity	X		
4.d.(17)	Quality of Service	X		
8.c	COST AS AN INDEPENDENT VARIABLE (CAIV)			

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	GROUND DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
8.c	Cost as an Independent Variable (CAIV)	X		
8.c.	Cost as an Independent Variable with an objective to reduce initial costs by 50 percent			X
	ANNEX C			
4.a.(1)	SYSTEM PERFORMANCE			
4.a.(1)(c)	Each JTR Set except the small form fit shall display of current own position location information	X		
4.a.(1)(d)	Each JTR Set shall display GPS latitude-longitude or the Military Grid Reference System that includes a 3-character grid, 2-character 100km square, and a 10-digit map coordinate.	X		
4.a.(1)(e)	Each JTR Set shall have the capability to receive over-the-air network timing; and capable of loading set time manually	X		
4.a.(1)(g)	Urban Terrain and Subterranean Communications Capability		X	
4.c.	LOGISTICS AND READINESS			
4.c.	JTR Set components shall be transportable worldwide (air, rail, sea, and air droppable)	X		
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)(o)	Each JTR Set shall survive HEMP	X		
4.d.(1)(p)	Each JTR Set shall be capable of being operated and maintained in a nuclear, biological, and chemical environment.	X		
4.d.(2)(a)	Each JTR Set shall draw no more primary power than the equipment replaced	X		
4.d.(2)(a)	Each JTR Set shall draw at least 75% less power than the equipment it replaces			X
4.d.(2)(b)	JTR Set capable of being operated with primary power derived from rechargeable batteries	X		
4.d.(2)(b)	JTR Set capable of being operating on national, host national AC power systems, and from new power systems			X
4.d.(4)	As applicable each JTR Set shall provide capability to access auxiliary voice/video/data	X		
4.d.(5)(a)	Provides safe, efficient, effective operation, maintenance by typically trained personnel while wearing NVGs, MOPP IV gear, and cold weather protective gear	X		
4.d.(5)(b)	Adhere to the guidance of applicable civilian and military standards (e.g. health hazards and threats to warfighters survivability)	X		
4.a.(1)	VEHICULAR SYSTEM PERFORMANCE			
4.a.(1)(b)	Provides capability for each JTR Set to be operated and controlled from remote locations up to 1.5-km	X		
4.a.(1)(b)	Provides capability for each JTR Set to be securely operated and controlled from remote locations up to 4-km			X
4.a.(1)(f)	JTR Vehicular Sets will store 10 waveforms within set	X		
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)(a)	Each vehicular JTR Set shall be smaller than the equipment that it replaces	X		
4.d.(1)(a)	Each vehicular JTR Set shall be 75% smaller than the equipment that it replaces			X
4.d.(1)(n)	Each vehicular JTR Set shall weigh less than the equipment it replaces	X		
4.d.(1)(n)	Each vehicular JTR Set shall weigh 75% less than the equipment it replaces			X
4.d.(3)(a)	In addition to GPS each vehicular JTR Set shall be scaleable for up to six channels	X		
4.d.(3)(a)	In addition to GPS each vehicular JTR Set shall be scaleable for up to eight channels			X

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	GROUND DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.a.(1)	MAN PACK SYSTEM PERFORMANCE			
4.a.(1)(f)	Each JTR man pack sets will store 10 waveforms within set	X		
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)(l)	Each man pack set including ancillary equipment shall not exceed 400 cubic inches	X		
4.d.(1)(l)	Each man pack set including ancillary equipment shall not exceed 200 cubic inches			X
4.d.(1)(m)	Each man pack JTR set shall not exceed 9 pounds	X		
4.d.(1)(m)	Each man pack JTR set shall not exceed 6 pounds			X
4.d.(3)(b)	In addition to GPS, each man pack JTR set shall be scaleable up to two channels	X		
4.d.(3)(b)	In addition to GPS, each man pack JTR set shall be scaleable up to four channels			X
4.a.(1)	HANDHELD SYSTEM PERFORMANCE			
4.a.(1)(f)	Each JTR handheld sets will store 6 waveforms within set	X		
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)(b)	Each one channel hand-held JTR Set, including the ancillary equipment, shall be no larger than the size of a comparable existing land mobile radio sets.	X		
4.d.(1)(c)	Each two channel hand-held JTR Set, including the ancillary equipment, shall be no larger than the size of a comparable two channel hand-held land mobile radio or two existing one channel hand-held land mobile radio sets	X		
4.d.(1)(d)	Each handheld JTR Set shall be no more than 2 pounds (one channel)	X		
4.d.(1)(d)	Each handheld JTR Set shall be no more than 3 pound (two channel)	X		
4.d.(1)(d)	Each handheld JTR Set shall be no more than 1 pound			X
4.d.(1)(e)	The handheld JTR Set shall utilize voice activation/control technology	X		
4.d.(1)(f)	Each handheld JTR Set shall have a minimum transmit/receive range of 5 KM	X		
4.d.(1)(f)	Each handheld JTR Set shall have a minimum transmit/receive range of 15 KM			X
4.d.(3)(c)	In addition to GPS, each handheld JTR Set shall provide one channel (Block 1)	X		
4.d.(3)(c)	In addition to GPS, each handheld JTR Set shall provide two channels (Block 1)			X
4.d.(3)(c)	In addition to GPS, each handheld JTR Set shall provide two channels (Block 2)		X	
4.d.(3)(c)	In addition to GPS, each handheld JTR Set shall provide three channels (Block 2)			X
4.a.(1)	SMALL FORM FIT SYSTEM PERFORMANCE			
4.a.(1)(f)	Each small form fit sets will store 2 waveforms within set set/subsystem/platform		X	
4.a.(2)	SECURITY PERFORMANCE PARAMETERS			
4.a.(2)(a)	Implementations of the small form fit JTR Set that only require the use of an unclassified crypto algorithm (s) for COMSEC or TRANSEC, and unclassified key (e.g., they will not process classified information), shall be capable of being handled as UNCLASSIFIED (non CCI)		X	
4.d.	OTHER SYSTEM CHARACTERISTICS			
4.d.(1)(g)	Each small form fit JTR Set being integrated into warfighters load bearing equipment shall not exceed 40 cubic inches for a 1-channel set without GPS, 50 cubic inches for a 1-channel set with GPS and guard capabilities, 80 cubic inches for a 1-channel set with a 20 watt power amplifier, 70 cubic inches for a 2-channel set without GPS and guard capabilities, 80 cubic inches for a 2-channel set		X	
4.d.(1)(g)	Each small form fit JTR Set being integrated into warfighter LBE shall not exceed 20 cubic inches for a 1-channel set with GPS and guard capabilities, and not exceed 40 cubic inches for a 2-channel with GPS and guard capabilities.			X

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	GROUND DOMAIN REQUIREMENTS BLOCKING	BLK 1	BLK 2	OBJ
PARA		FY-06	FY-07	
4.d.(1)(h)	Each small form fit JTR Set integrated into emerging individual warfighters equipment shall be compatible with voice activation/control technology.		X	
4.d.(1)(i)	Each small form fit JTR Set being integrated into warfighter LBE shall be no more than 1.2 pounds for a 1-channel set, 1.6 pounds for a 1-channel with GPS and guard capabilities, 2.2 pounds for a 2-channel set without GPS and 2.6 pounds for a two channel set with GPS and guard capabilities.		X	
4.d.(1)(i)	Each small form fit JTR Set being integrated into warfighter LBE shall be no more than 1 pound for a 1-channel set with GPS and guard capabilities and shall be no more than 2 pounds for a 2-channel set with GPS and guard capabilities.			X
4.d.(1)(j)	Each small form fit (sensor (e.g., UGVs, UAV, etc.)) JTR Set shall not exceed 25 percent of the sensor payload total weight		X	
4.d.(1)(k)	Each small form fit JTR Set being integrated into warfighter load bearing equipment shall have a line-of-sight transmission capability that must communicate using a network sensor communications grid of distances up to 15 KM area of operations		X	
4.d.(1)(k)	Each small form fit JTR Set being integrated into warfighter load bearing equipment shall have a line-of-sight transmission capability that must communicate using a network sensor communications grid of distances up to 30 KM area of operations			X
4.d.(3)(d)	Each small form fit set shall provide one channel (Block 1)		X	
4.d.(3)(d)	In addition to GPS, each small form fit JTR Set shall provide one channel (Block 1)		X	
4.d.(3)(d)	Each small form fit JTR Set shall provide two channels (Block 2)		X	
4.d.(3)(d)	In addition to GPS, each small form fit JTR Set shall provide two channels (Block 2)		X	
4.d.(3)(d)	In addition to GPS, each small form fit JTR Set shall provide three channels.			X

TABLE C-5

NOTE: V= Vehicular, M= Man Pack, HH= Hand-held, SFF= Small Form Fit, N/A =Not Applicable, OBJ=Objective

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	GROUND DOMAIN SUPPORTED WAVEFORMS	FY-06	FY-07	FY-08	OBJ
WF#1	*SINCGARS ESIP (VHF-FM Military Tactical AJ)	V,M,HH	SFF		
WF#2	*HAVE QUICK II (UHF-AM/FM/PSK Military Tactical AJ)	V,M, HH	SFF		
WF#3	*UHF SATCOM Military (181-182-183 DAMA)	V,M			
WF#4	*Enhanced Position Location Reporting System (EPLRS)	V	M,	HH, SFF	
WF#5	*Wideband Networking Waveform (WNW)	V,M		HH, SFF	
WF#6	*Link 16 / TADIL-J	V			M
WF#7	UHF SATCOM Military Protocol (184)	V,M			
WF#8	HF Independent Side Band (ISB) w/Automatic Link Establishment (ALE)	V			
WF#9	HF Single Side Band (SSB) w/Automatic Link Establishment (ALE) AJ	V,M			HH
WF#10	Link 11 / TADIL-A		V		
WF#13	HF ATC Data Link	V,M			
WF#14	VHF FM Military Tactical	V,M,HH			
WF#15	VHF for ATC	V			M
WF#16	VHF AM ATC	V,M,HH			
WF#17	VHF/UHF FM LMR	M,HH	V, SFF		
WF#18	VHF ATC Data Link (NEXCOM)	V,M			
WF#19	UHF AM/FM PSK Military Tactical	V,M			
WF#21	Link 11B / TADIL-B		V		
WF#22	SATURN (UHF PSK AJ NATO)		M	V	
WF#23	STANAG 4193 Mode S Level 4/5		V		
WF#24	Digital Wideband Transmission System (DWTS) (UHF PSK WB LOS)		V		
WF#25	Soldier Radio & WLAN & Advanced Capability	HH,M	SFF	V	
WF#26	COBRA	HH			
WF#27	MUOS-CAI		V,M,HH SFF		
WF#28	Cellular Radio & PCS		HH	V,M,SFF	
WF#30	Mobile Satellite Service (MSS)				V,M,H H
WF#31	Integrated Broadcast Service (IBS) - M			V, M	
WF#32	Bowman Waveform Family		V(VHF)		V(HF/ UHF)

TABLE C-6

NOTE 1: V= Vehicular, M= Man Pack, HH= Hand-held, SFF= Small Form Fit, N/A =Not Applicable, OBJ= Objective.

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ANNEX D

CORE CAPABILITIES

Paragraph	Requirement	Core Performance Requirements
4.a.(1)(a)	System Support Of Communications	Secure/Non secure Voice, Video, and Data. (SFF (Block 1) and HH (Block 1) - V/D contention acceptable)
4.a.(1)(b)	Program Growth Capability	Threshold
4.a.(1)(c)	Software Re/Configuration	Threshold
4.a.(1)(d)	Hardware Re/Configuration	Threshold
4.a.(1)(e)	Routing And Retransmission	Secure/Non Secure Voice and Data within like mode and at like data rates for KPP Waveforms. (SFF (Block 1) and HH (Block 1) – N/A)
4.a.(1)(f)	Domain Waveform Supportability	KPP Waveforms IAW Domain Annexes (Annexes A through C)
4.a.(1)(g)	Domain Radio Frequency Operation Range	To support KPP Waveforms
4.a.(1)(h)	Multi Channel Operation	Simultaneous Multiple Channel Operations
4.a.(1)(k)	Scan/Preset	Threshold
4.a.(1)(l)	IK And Ancillary Interfaces	Threshold
4.a.(1)(m)	Power Restoration	Restore operational configuration
4.a.(1)(n)	Standard Interface	Voice and data, as required for operational configuration
4.a.(1)(o)	GPS Channel	Threshold (SFF Block 1 without GPS & SFF Block 2 without GPS – N/A)
4.a.(1)(r)	Joint Network Interoperability	Threshold
4.a.(2)(a)	Embedded Crypto	Threshold
4.a.(2)(b)	Security Level	Threshold
4.a.(2)(c)	TRANSEC	Threshold
4.a.(2)(d)	EKMS	Threshold
4.a.(2)(e)	Over The Air Transfer	OTAT with alert as supported by legacy waveform
4.a.(2)(f)	Remote ID And Exclusion	Remote ID – WNW and as supported by legacy waveforms
4.a.(2)(g)	Crypto Retention	Threshold
4.a.(2)(j)	Crypto Systems Interface	Platform specific
4.a.(2)(k)	CCI Storage	Threshold
4.a.(2)(l)	Zeroization	Threshold
4.a.(2)(o)	DII Key Management	Threshold
4.a.(3)(a)	Scaleable Networking	KPP waveforms (SFF (Block 1) and HH (Block 1) – N/A)
4.a.(3)(b)	Network Extension/coverage	WNW and as supported by legacy waveforms.
4.a.(3)(c)	Scaled Communications	Point to Point – all waveforms; Multi Point/Multi Cast and Broadcast – WNW and as supported by legacy waveforms (SFF (Block 1) and HH (Block 1) -N/A)
4.a.(3)(d)	Mobile Users	WNW and future waveforms
4.a.(3)(e)	Routing	Threshold – US Military only
4.a.(3)(f)	Dynamic Routing	Organize and manage – as supported by legacy waveform; Organize, Manage and Dynamic Routing – WNW and future waveforms
4.a.(3)(g)	Network Management	WNW and future waveforms
4.a.(3)(h)	Situational Awareness	WNW and future waveforms
4.a.(3)(i)	Network Throughput And Latency	KPP waveforms
4.a.(3)(m)	System Reconfiguration	WNW (no time requirement) and waveforms as supported by legacy systems.
4.a.(3)(n)	Asymmetric Networking	WNW and as supported by legacy systems.
4.a.(4)(a)	Interoperate w/Joint Network Mgmt Tools	WNW and as supported by legacy waveforms.
4.a.(4)(b)	Remotely Identify and Configure User Access	WNW and as supported by legacy waveforms.
4.a.(5)(c)	Automatic Selection of Frequency	Threshold
4.c.(1)	Operational Availability (Ao)	Threshold

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4.d.(1)	Listening Silence	Threshold
4.d.(11)	Spectrum Mgmt Policies/Global Operations	Threshold

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ANNEX E

SUPPORTED JTRS WAVEFORMS CHARACTERISTICS TICSSUPPORT ED JTRS WAVEFORMS CHARACTERISTICS TICS WAVEFORM (Short ORD Name & Description)	ORD ID	FREQUENCY BAND	NOMINAL CHANNEL BANDWIDTH	INFORMATION VOICE and/or DATA RATES	CRITERIA [and COMMENTS in brackets] [Latest Versions of Documents Shall be Applied]
*SINGARS ESIP (VHF-FM Military Tactical AJ)	W1	30-88 MHz	25 KHz	VOICE (A & D 16 Kbps) & DATA 75 Bps to 16 Kbps	Single Channel Ground Air Radio System (SINGARS) with Enhanced SINGARS Improvement Program (ESIP). MIL-STD-188-220 & -241-1/-2 compliant. Includes guard (non-hop 40.50 MHz et al) & inband signals ("SINGARS squelch" 150 Hz tone, et al). Includes AJ.
*HAVE QUICK II (UHF-AM/FM/PSK Military Tactical AJ)	W2	225-400 MHz	25 KHz	(T) VOICE (A & D 16 Kbps) plus (O) DATA 75 to 16 Kbps (see)	MIL-STD-188-220 & -243 and JIEO-9120A compliant. Includes guard (non-hop 243.0 & 282.8 MHz et al) (but inband signals TBD.) Data 75, 150, 300, 600 Bps; 1.2, 2.4, 4.8, 9.6, 16 Kbps with required IDM.
*UHF SATCOM Military (181-182-183 "DAMA")	W3	225-400 MHz	5 and 25 KHz	(T) VOICE (A & D) & DATA 75 Bps to 56 Kbps (see) / (O) 64 Kbps	MIL-STD-188-181 & -182 DAMA & -183 DAMA/TDMA compliant. Includes STANAG 4321 version 4. Includes DAMA-C FUW GPRS. Includes DAMA guard lists (but inband signals TBD.) THRESHOLD Data 75, 300, 600 Bps; 1.2, 2.4, 4.8, 9.6, 16, 19.2, 28.8, 32, 38.4, 48, 56 Kbps; and OBJECTIVE up to 64 Kbps (already demonstrated).
*EPLRS	W4	420-450 MHz	3 MHz [For each of 4 hop bands]	DATA 57 Kbps VHSIC SIP, plus 228 Kbps VECP	Enhanced Position Location Reporting System (EPLRS) with version 11 or higher (in lieu of Situational Awareness Data Link (SADL) functionality). TDMA /CDMA /FDMA. CDRL-4002W-001A compliant.
*WNW	W5	[Government or Vendor Developed]	[Government or Vendor Developed]	[Government or Vendor Developed]	Wideband Networking Waveform (WNW). Compliant with WNW Functional Description Document (FDD) version 2.31 or later. [New, modified or existing waveform, expected over 2 MHz to 2 GHz at up to 5 Mbps network throughput.] [Guards & inband signals TBD.]
*Link-16 / TADIL-J	W6	960-1215 MHz	3 MHz [51 to 37 freqs]	VOICE (D 2.4 & 16 Kbps) & DATA w/ FEC 28.8 Kbps to 1.137 Mbps	MIL-STD-6016 & STANAG 5516 compliant. Data with FEC 28.8, 57.6, 115.2, 119.0, 238.1 Kbps, up to 1.137 Mbps [FDMA /TDMA /CDMA ECCM-AJ TADIL, with emerging IP bearer services.]
UHF SATCOM Military Protocol (184)	W7	N/A	N/A	N/A	MIL-STD-188-184 Data Control Waveform. Robust link protocol only, required for reliable data transport over UHF SATCOM, normally employing MIL-STD-188-181, -182, & -183 single access, 5 & 25 KHz channels.
HF-ISB ALE	W8	(T) 2-30 MHz (O) 1.5-30 MHz	3 / 6 / 12 KHz	VOICE (A & D) & DATA 75, 150, 300, 600, 1200, 2400,	High Frequency (HF) - Independent Side Band (ISB) with Automatic Link Establishment (ALE). Fully compliant with MIL-STD-188-141B including as mandatory Appendices A-

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SUPPORTED JTRS WAVEFORMS CHARACTERISTICS TICSSUPPORT ED JTRS WAVEFORMS CHARACTERISTICS WAVEFORM (Short ORD Name & Description)	ORD ID	FREQUENCY BAND	NOMINAL CHANNEL BANDWIDTH	INFORMATION VOICE and/or DATA RATES	CRITERIA [and COMMENTS in brackets] [Latest Versions of Documents Shall be Applied]
				3200, 4800, 6400, 8000, 9600 Bps, per ISB channel	(ALE) & B- Linking Protection (LP) & C- Third Generation (3G) and -MIL-STD-188-110B including as mandatory Appendices C- Data Above 2400 bps & F- Multiple Channel Systems. OBJECTIVE to 1.5 MHz in compliance with STANAG-4203, QSTAG-733, et al. Includes HF guards (non-hop 2182 & 5680 KHz et al) & inband signals (SELCAL et al). [Optional MD-1295/A DATA modem.]
HF-SSB ALE AJ	W9	(T) 2-30 MHz (O) 1.5-30 MHz	3 KHz	VOICE (A & D) & DATA 75, 150, 300, 600, 1200, 2400, 3200, 4800, 6400, 8000, 9600 Bps per SSB channel	High Frequency (HF) - Single Side Band (SSB) with Automatic Link Establishment (ALE) and Anti-Jam (AJ). Fully compliant with MIL-STD-188-141B including as mandatory Appendices A- (ALE) & B- Linking Protection (LP) & C- Third Generation (3G) and -MIL-STD-188-110B including as mandatory Appendices C- Data Above 2400 bps & F- Multiple Channel Systems and MIL-STD-188-148 HF AJ ECCM. OBJECTIVE to 1.5 MHz in compliance with STANAG-4203, QSTAG-733, et al. Includes HF guards (non-hop 2182 & 5680 MHz et al) & inband signals (SELCAL et al). [Optional MD-1295/A data modem.]
Link-11 / TADIL-A	W10	2-30 MHz and 225-400 MHz	3 and 25 KHz	DATA 1364 & 2250 Bps	MIL-STD-188-203-1A & STANAG 5511 compliant.
STANAG 5066 (HF Message Protocol)	W11	N/A	N/A	N/A	Protocol only, transported over supporting HF waveforms HF-SSB/SSB (W8 & W9) and employing MIL-STD-188-141 & -110. OBJECTIVE to 1.5 MHz in compliance with STANAG-4203, QSTAG-733, et al.
STANAG 4529 (HF NB Modem)	W12	(T) 2-30 MHz (O) 1.5-30 MHz	1.24 KHz	DATA 75, 150, 300, 600, 1200 Bps FEC, up to 1.8 Kbps	Narrowband HF modem standard, transported over MIL-STD-188-141 or STANAG 4203... Requires Forward Error Correction (FEC) coding fully compliant with STANAG 4285 Annex E. OBJECTIVE to 1.5 MHz in compliance with STANAG-4203, QSTAG-733, et al.
VHF-FM – Military Tactical	W13	30-88 MHz	25 KHz and 50 KHz	VOICE (A & D 16 Kbps)	MIL-STD-188-242 compliant. Includes guard (40.50 MHz et al) & inband signals (“new squelch” 150 Hz tone et al). Includes legacy non-AJ for Allied and Coalition interoperability.
HF ATC Data Link	W14	(O) 2-30 MHz (O) 1.5-30 MHz	3 KHz	VOICE (A) & DATA 300, 600, 1200, 1800 Bps	Air Traffic Control (ATC). RTCA DO-265, ARINC 635-3 & -735-3, and FAA TSO-C31d & -C32d compliant TDMA and FDMA. OBJECTIVE to 1.5 MHz in compliance with STANAG-4203, QSTAG-733, et al. [Packet data.]
VHF-AM ATC	W15	(T) 118-137 MHz	8.33 KHz [Includes 25	VOICE (A) 16 Kbps	Air Traffic Control (ATC). RTCA DO-186a & ARINC 716 compliant and NAS Architecture with future 108-118 MHz

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SUPPORTED JTRS WAVEFORMS CHARACTERISTICS TICS SUPPORTED JTRS WAVEFORMS CHARACTERISTICS TICS WAVEFORM (Short ORD Name & Description)	ORD ID	FREQUENCY BAND	NOMINAL CHANNEL BANDWIDTH	INFORMATION VOICE and/or DATA RATES	CRITERIA [and COMMENTS in brackets] [Latest Versions of Documents Shall be Applied]
		(O) 108-137 MHz	KHz]		(presently VOR/ILS and emergency ATC voice). Navigation uses may require increased reliability and availability. Includes legacy 25 KHz plus European 8.33 KHz. Includes VHF guards (121.5 & 123.0 MHz et al) & inband signals (ELT & SELCAL et al).
VHF-AM ATC Extended	W16	108-156 MHz	25 KHz	(T) VOICE (A) (O) VOR/ILS Nav (A)	Air Traffic Control (ATC), VHF Omni-Range (VOR), and Instrument Landing System (ILS). QSTAG-706 & RTCA DO-186a & -195 & -196 & ARINC 716 compliant, and NAS Architecture with future 108-118 MHz (presently VOR/ILS and emergency ATC voice). Navigation uses may require increased reliability and availability. Includes extended legacy 25 KHz. Includes VHF guards (121.5 & 123.0 MHz et al) & inband signals (ELT & SELCAL et al).
VHF/UHF-FM LMR: (Land Mobile Radio & Public Safety w/ Project-25 and TETRA) [Waveform Family]	W17	(T) "Low"= 25-54 MHz (T) "Mid"= 72-76 MHz (T) "High"= 136-174 MHz (T) "220"= 216-225 MHz (T) "UHF/T"= 380-512 MHz (T) "800"= 764-869 MHz (O) "TV"= 686-960 MHz	"Low" NTIA & FCC (T) 20 KHz "Mid" & "High" FCC (T) 30 & 15 KHz / (O) 7.5 KHz "High" thru "TV" NTIA & FCC (T) 25 & 12.5 KHz / (O) 6.25 KHz "220" FCC (T) 5 KHz FM & SSB	VOICE (A & D 16 Kbps) & DATA up to 16 Kbps	Includes Homeland Security (HLS) & Defense (HLD) legacy interoperability with both NTIA and FCC, digital & analog, "wideband," "narrowband," & future "very narrowband" systems, plus International Maritime VHF. Project-25 compliant includes Common Air Interface (CAI) for subscriber units (not infrastructure) for JTRS unit-unit and unit-infrastructure use. Includes capability for NSA/NIST Type 1 through 4 COMSEC. Includes VHF/UHF guards (47.42, 156.8 / 156.525 and 866.0125 MHz et al) & inband signals (ELT & DSC, CTCSS & DTMF et al). Shall include future upgrade to Terrestrial Trunked Radio (TETRA) and frequency flexibility for overseas LMR bands, including 380-400 MHz NATO Emergency Services and 400-430 MHz European Civil bands, et al. "220" Band utilizes Single Side Band (SSB) and/or Narrow Band FM (NBFM) in 5 KHz. OBJECTIVE includes emerging "TV" bands (channels 70-83 806-in 890 MHz and 50-69 in 686-806 MHz.).
VHF ATC Data Link (NEXCOM)	W18	118-137 MHz	25 KHz	VOICE (D 4.8 Kbps) & DATA 31.5 Kbps	RTCA DO-186a & -224a compliant, a.k.a. VDL 2 & 3 Next Generation Communications (NEXCOM) FUW FAA CONUS and overseas & military ATC.
UHF-AM/FM/PSK Military Tactical	W19	(T) 225-400 MHz (O) 225-450 MHz	5 and 25 KHz	(T) VOICE (A & D 16 Kbps) & (O) DATA up to 16 Kbps (w/ IDM)	MIL-STD-188-181B & -243 compliant. Includes FAA CONUS and overseas & military ATC operations. Includes UHF guards (243.0 / 282.8 / (O) 406.025 MHz et al) & inband signals (ELT & SELCAL, CTCSS & DTMF et al). OBJECTIVE includes ability to exploit (both transmit and receive) 406 beacon position location systems, including

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SUPPORTED JTRS WAVEFORMS CHARACTERISTICS TICSSUPPORT ED JTRS WAVEFORMS CHARACTERISTICS WAVEFORM (Short ORD Name & Description)	ORD ID	FREQUENCY BAND	NOMINAL CHANNEL BANDWIDTH	INFORMATION VOICE and/or DATA RATES	CRITERIA [and COMMENTS in brackets] [Latest Versions of Documents Shall be Applied]
					interface to GPS, IAW TSO C-126. [Data up to 16 Kbps w/ optional IDM.] [Optional implementation of VDL 2 & 3 NEXCOM FUW FAA CONUS up to 31.5 Kbps]
Link-4A / TADIL-C	W20	225-400 MHz	25 KHz	DATA 5 Kbps	MIL-STD-188-203-3 compliant.
Link-11B / TADIL-B	W21	225-400 MHz	25 KHz	DATA 600, 1200, 2400 Bps	MIL-STD-188-212 & STANAG 5511 compliant
SATURN (UHF PSK AJ NATO)	W22	225-400 MHz	25 KHz	VOICE (D) & DATA [Rates TBP]	Second generation Anti-jam Tactical UHF Radio for NATO (SATURN). STANAG-4372 & JIEO-9120A compliant. [See also W2 AJ, and W19 non-AJ.]
STANAG 4193 Mode S Level 4/5	W23	1030 & 1090 MHz	3.5 MHz / 3 MHz	DATA 689.7 Bps (1.45 uS PCM) IFF Family, and 9.6 to 128 Kbps Mode S, plus others per Standards.	Fully compliant with STANAG 4193 including Mode Select (Mode S), Levels 5 & 4 lower. THRESHOLD includes both transponders and interrogators on platforms and at low transmit powers. OBJECTIVE includes upgrade to high power (ground-based and airborne warning et al) interrogators. Includes Mark X & XII/A with all Identification Friend or Foe (IFF) and Selective Identification Feature (SIF) Modes 1 through 5 and A & C, and ACP-160 and ICAO Annex 10 compliance. Includes civil secondary Air Traffic Control Radar Beacon System (ATCRBS), Airborne Collision Avoidance System (ACAS) and Traffic Alert & Collision Avoidance System (TCAS), and Automatic Dependent Surveillance – Addressable (ADS-A) and Broadcast (ADS-B) functionality. Includes supporting interface to GPS and other systems for flight, navigation and timing data. ADS requires interface to SATCOM, VHF Data Link, and other alternate channels IAW platform capabilities and mission needs. Includes generation of, and detection and alarm on, emergency messages, including ATCRBS (7700 emergency, 7600 communications failure, et al) and special military (4X et al) codes.
DWTS (UHF PSK WB LOS)	W24	1350-1850 MHz (NATO Band 3)	125 KHz	VOICE Order Wire (A & D) and DATA 144, 256, 288, 512, 576, 1024, 1152, 1544, 2048, 2304 Kbps	Digital Wideband Transmission System (DWTS). Shipboard system for high capacity secure & nonsecure, line-of-sight (LOS), ship-to-ship, and ship-to-shore, digital voice/data/imagery communications in the UHF range and interface into Marines ashore and Army Mobile Subscriber Element (MSE) et al.

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SUPPORTED JTRS WAVEFORMS CHARACTERISTICS TICS SUPPORTED JTRS WAVEFORMS CHARACTERISTICS TICS WAVEFORM (Short ORD Name & Description)	ORD ID	FREQUENCY BAND	NOMINAL CHANNEL BANDWIDTH	INFORMATION VOICE and/or DATA RATES	CRITERIA [and COMMENTS in brackets] [Latest Versions of Documents Shall be Applied]
Soldier Radio & WLAN [Waveform Family]	W25	(T) 1.755-1.850 GHz Army LW 2.450-2.483.5 GHz COTS	13 MHz (COTS provides 11 overlapping channels)	(T) VOICE (D 16 Kbps) & DATA 1 Mbps DATA 1, 2, 5.5, 11 Mbps	Wireless Local Area Network (WLAN). Army Land Warrior (LW) Program includes basic Direct Sequence Spread Spectrum (DSSS) IEEE 802.11 wireless Ethernet LAN standard at 1 Mbps. Includes security capability up to NSA Type 1. Includes COTS multiple channels in 2.4 GHz band and upgrade to 802.11b 11 Mbps. 802.11e FEC & 802.11g 54 Mbps et al, plus use of dual diversity antennas. Advanced Capability: 350 MHz – 2.5 GHz; 350 MHz – 1GHz (Band 2); & 1 GHz – 2.5 GHz (Band 3) [Guards & inband signals not known to be applicable.]
COBRA	W26	340-400 MHz	TBP	TBP	Includes interoperability with CSEL et al and support for GPRS and CSAR. [Characteristics to be provided to authorized users.]
MUOS-CAI	W27	240-320 MHz	5 & 25 KHz	DATA 2.4, 9.6, 16, 32, 64 Kbps	Mobile User Objective System (MUOS) – Common Air Interface (CAI). [Guards & inband signals TBD.]
Cellular Radio & PCS [Waveform Family]	W28	(T) 824-894 MHz (T) 890-960 MHz (T) 1850-1990 MHz (O) 1850- 2200 MHz IAW standard & Host Nation	30 KHz to 1.6 MHz 3G to 5xN MHz IAW standard & Host Nation	VOICE a/o DATA – 10 Kbps nominal 3G DATA up to 144/384 Kbps & 2 Mbps IAW standard & Host Nation	Includes multiple US and overseas standards – TR-45.1 AMPS & IS-54 TDMA & -IS-95b CDMA & IS-136 HS TDMA & GSM & 3GSM & 2.5G & 3G & WCDMA & CDMA-2000 et al compliant. Includes both cellular telephone and Personal Communications Services (PCS), providing voice, data, short message services (SMS), et al... Includes Enhanced Specialized Mobile Radio (ESMR), interoperable with 900 MHz band and iDEN (NEXTEL, Southern-Link, et al) protocols, et al. Includes capability for NSA/NIST Type 1 through 4 COMSEC. Shall include ability to use any available Wireless Priority Access Service (WPAS) or equivalent for assured access and capacity. Shall include ability to exploit cell phone position location systems, including interface to GPS. Includes inband signals (DTMF et al). [Note – 1994 FCC PCS plan 1850-2200 MHz.]
Link 22 / NILE	W29	3-30 MHz and 225-400 MHz	TBD	DATA (rate TBD)	NATO Improved Link Eleven (NILE). STANAG 5522 compliant. Requires modem waveforms in STANAG 4539 Annex D.

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SUPPORTED JTRS WAVEFORMS CHARACTERISTICS SUPPORTED JTRS WAVEFORMS CHARACTERISTICS WAVEFORM (Short ORD Name & Description)	ORD ID	FREQUENCY BAND	NOMINAL CHANNEL BANDWIDTH	INFORMATION VOICE and/or DATA RATES	CRITERIA [and COMMENTS in brackets] [Latest Versions of Documents Shall be Applied]
MSS [Waveform Family]	W30	137-150 MHz 1.61-2 [2.5] GHz and per system	TBD per system	VOICE (D 2.4 to 9.6 Kbps et al) & DATA 2.4, 9.6 Kbps up to 2.048 Mbps per system	Mobile Satellite Service (MSS). Includes both VHF and UHF MSS bands and both fielded and emerging LEOSAT & MEOSAT systems and standards, such as IRIDIUM, Globalstar, et al. Includes capability for NSA/NIST Type 1 through 4 COMSEC. OBJECTIVE includes capability to utilize GEOSAT systems such as Motient (formerly AMSC) and INMARSAT, et al. Addition of appropriate antenna systems may be required. OBJECTIVE also includes future expansion bands to 2.5 GHz. [OBJECTIVE includes transoceanic aviation use of INMARSAT AERO-I and AERO-H FUW GANS and GATM.]
IBS-M	W31	225-400 MHz	5 and 25 KHz	DATA 2.4, 4.8, 9.6 & 19.2 Kbps	Integrated Broadcast Service Module (IBS-M). As a "Single JTRS Channel" and multiples as follows – THRESHOLD is parallel receive 4X & transmit 0X data streams, implemented in a single "JTRS channel" and OBJECTIVE is up to receive 12X & transmit 4X; potentially implemented as several "JTRS channels" with all cases including necessary multiple cryptographic streams. Integrated Broadcast Service (IBS) - Currently consists of three legacies UHF broadcasts (TIBS, TDDS, and TRIXS) which will be replaced in the future with a Common Interactive Broadcast (CIB). The CIB will be a DAMA compliant broadcast using a developing Integrated Waveform, MIL-STD-188-181C/-182B/-183B. Data carried over IBS will be an IBS Common Message Format (CMF), which will be a member of the J-Series family of message formats."
BOWMAN (UK HF/VHF/UHF Military Tactical) [Equipment Family]	W32	HF-1.6 60 MHz VHF- 30-80 MHz UHF-225-450 MHz	3 KHz 25 KHz 600 KHz & 4MHz	75-2400 bps 156 Kbps 500 Kbps	"BOWMAN" is the designator for the UK Tri-Service Tactical communications System. [Guards & inband signals TBD.] Includes BOWMAN-HF (per Harris RF-5800), BOWMAN-VHF (per ITT ADR+ variant of SINCGARS) and BOWMAN-UHF (per ITT High Capacity Data Radio (HCDR) variant of Naval Tactical Data Radio (NTDR)). [NOTE - US-UK interoperability criteria under negotiation by OSD and JS.]

TABLE E-1 SUPPORTED JTRS WAVEFORMS CHARACTERISTICS

Note: *= KPP (also shown in **BOLD**)

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APPENDIX A**

REFERENCES

DoDD 5200.1M, DoD Information Security Program.

DoDD 8500.1 and International Common Criteria (ICC).

DoDD S-3600.1, "Information Operations."

Attachments 1, Defense Acquisition System, Current Version.

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Attachment 2, Operation of the Defense Acquisition System, Current Version.

DoD Instruction 4630.8, Current Version, "Procedures for Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence (C3I) Systems" (see <http://web1.deskbook.osd.mil/>).

DoD Directive 4630.5, Current Version, "Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence (C3I) Systems" (see <http://web1.deskbook.osd.mil/>).

DoD Electronic Desk Reference Set, "Defense Acquisition Desk Book", Current Version (see <http://www.deskbook.osd.mil/>).

CJCS Instruction 3170.01, Current Version, "Requirements Generation System" (see <http://www.dtic.mil/doctrine/jel/cjcsd/cjcsi.htm>).

CJCS Manual 3500.4, Current Version, Universal Joint Task List

CJCS Instruction 6212.01, Current Version, "Interoperability and Supportability of National Security Systems, and Information Technology Systems" (see <http://www.dtic.mil/doctrine/jel/cjcsd/cjcsi.htm>).

C4ISR Architecture Framework, Current Version, (see <http://www.c3i.osd.mil/org/cio/i3/AWG/Digital/Library/index.htm>).

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The Defense Information Infrastructure (DII) Master Plan, "Implementing the Global Information Grid", Current Version (see SIPRNET - <http://199.208.165.20/diimp/dii.htm>).

Director for Central Intelligence Directive (DCID) 6/3, Protecting SCI within Information Systems.

Director for Central Intelligence Directive (DCID) 1/21, Manual for Physical Security Standards for Sensitive Compartmented Information Facilities (SCIF).

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Memorandum, HQ, TRADOC, Proposed Operational Requirements Document (ORD) for the Global Positioning System (GPS) Tactical Receivers (GTR).

Department of Defense Global Positioning System (GPS), Office of the Assistance Secretary of Defense (Command, Control, Communications, and Intelligence).

Global Information Grid Capstone Requirements Document, Current Version.

NSTISSI NO. 4009. National Information Systems Security (INFOSEC) Glossary, Current Version.

Army Battle Command Systems (ABCS) Capstone Requirements Document (CRD) Current Version.

Capstone Requirements White Paper for Joint Tactical Command, Control, Communications and Computers (C4) to Meet the Needs of 2010 and Beyond, Current Version.

Joint Vision 2020

Army Objective Force C4ISR Concept (Draft)

Force XXI Battle Command Brigade and Below (FBCB2) Operational Requirements Document (ORD), Current Version.

The Army Digitization Master Plan, Current Version.

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The Army Plan (TAP), Current Version. The U.S. Army Modernization Plan, Secretary of the Army, Current Version.

The Joint Tactical Radio System (JTRS), Cluster 1, Simulation Support Plan, Version 2.0 (Draft), USAISEC, Modeling and Simulation Team, Fort Huachuca, AZ, Current Version.

Theater and Air Missile Defense Capstone Requirements Document, Current Version.

Close Air Support Capstone Requirements Document, Current Version.

Combat Identification Capstone Requirements Document, Current Version.

ASD C3I Memorandum: Policy Guidance for use of Mobile Code Technologies in DoD Information Systems, Current Version.

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APPENDIX B**

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U.S. JOINT FORCES COMMAND, ATTN: J61/J85/J86, 1562 MITSCHER AVE,
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M/R/RO/S, ATDO-A/SO/SE, ATIN-I, ATAN-A, ATBO-SO/SE, ATOM-FA,
FORT MONROE, VA 23651-5000
U.S. ARMY ENGINEER CENTER, ATTN: ATSE-TPIO-TD/ATZT-DCD,
FORT LEONARD WOOD, MO 65473-5000
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U.S. ARMY AIR DEFENSE ARTILLERY CENTER AND FORT BLISS,
ATTN: ATZC-DCD, FORT BLISS, TX 79916-6816
U.S. ARMY TRANSPORTATION CENTER AND FORT EUSTIS,
ATTN: ATZF-DCD, FORT EUSTIS, VA 23604-5000
U.S. ARMY ARMOR CENTER AND FORT KNOX, ATTN: ATZK-DCD,
FORT KNOX, KY 40121-5000
U.S. ARMY CHEMICAL AND MILITARY POLICE CENTERS AND FORT
MCCLELLAN, ATTN: ATZN-DCD, FORT MCCLELLAN, AL 36205-5000
U.S. ARMY AVIATION CENTER AND FORT RUCKER, ATTN: ATZQ-DCD,
FORT RUCKER, AL 36362-5000
U.S. ARMY FIELD ARTILLERY CENTER AND FORT SILL, ATTN: ATZR-DCD,
FORT SILL, OK 73503-5000
U.S. ARMY COMBINED ARMS CENTER AND FORT LEAVENWORTH,
ATTN: ATZL-TP/CAC, FORT LEAVENWORTH, KS 66027-5000
U.S. ARMY SIGNAL CENTER AND FORT GORDON,
ATTN: ATZH-CDA/CDF/CDP/CDM/TS/TR/WT/NM/CG,
FORT GORDON, GA 30905-5000

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U.S. ARMY SIGNAL COMMAND, ATTN: ASFM-M-ASOP-FD-OPS, FORT HUACHUCA, AZ 85613-5000

U.S. ARMY TRADOC ANALYSIS COMMAND FORT LEAVENWORTH, ATTN: ATRC-F, FORT LEAVENWORTH, KS 66027-5200

U.S. ARMY COMMUNICATIONS AND ELECTRONIC COMMAND, ATTN: AMSEL-AD/RD/SE/LC/LM/CG, SFAE-CM, FORT MONMOUTH, NJ 07703-5000

DIRECTOR:

NATIONAL SECURITY AGENCY, ATTN: V34, JTRS, PROGRAM OFFICE, FORT MEADE, MD 20755

U.S. ARMY NUCLEAR AND CHEMICAL AGENCY, ATTN: ATNA-NU/CM, 7150 HELLER LOOP, SUITE 101, SPRINGFIELD, VA 22150-3198

TWVRMO, ATTN: ATZF-TWV, SUITE 405, BLDG 705, FORT EUSTIS, VA 23604-5456

MILITARY TRAFFIC MANAGEMENT COMMAND – TRANSPORTATION ENGINEERING AGENCY, ATTN: MTTE-DPE,

720 THIMBLE SHOALS BLVD., SUITE 130, NEWPORT NEWS, VA 23606-2574

U.S. ARMY MATERIEL COMMAND LOGISTICS SUPPORT ACTIVITY, ATTN: AMXLS-AE, BLDG 5307, REDSTONE ARS, AL 35898-7466

U.S. ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY, ATTN: AMXSY-CA, ABERDEEN PROVING GROUND, MD 21005-5071

TRADOC ANALYSIS CENTER WSMR, ATTN: ATRC-W, WHITE SANDS MISSILE RANGE, NM 88002-5502

U.S. ARMY RESERVE, HQDA DAAR-OP-S, WASHINGTON, D.C. 20310-2400

DEFENSE INFORMATION SYSTEMS AGENCY, ATTN: DIS, CIM, X17, TFDA, WASHINGTON, D.C. 20305-2000

DEFENSE INFORMATION SYSTEMS AGENCY, ATTN: IN42, BLDG 283, FORT MONMOUTH, NJ 07703-5613

DEFENSE INFORMATION SYSTEMS AGENCY, ATTN: DNSO-DIPT, COURTHOUSE RD, WASHINGTON D.C. 20305-2000

PROGRAM EXECUTIVE OFFICER:

PROGRAM EXECUTIVE OFFICER, COMMAND, CONTROL, COMMUNICATIONS SYSTEMS, ATTN: SFAE-CC-SEO, SFAE-CM-SE, FORT MONMOUTH, NJ 07703-5000

PROGRAM EXECUTIVE OFFICER, STANDARD ARMY MANAGEMENT INFORMATION SYSTEMS (STAMIS), ATTN: SFAE-PS, 9350 HALL RD, SUITE 142, FORT BELVIER, VA 22060-5526

PROGRAM MANAGER:

PROGRAM MANAGER, COMBAT SERVICE SUPPORT CONTROL SYSTEM (CSSCS), ATTN: SFAE-C3S-CSS, 6020 MEADE ROAD, SUITE 103, BLDG 1908, STOP 5259, FORT BELVIER, VA 22060-5259

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SQUIER HALL, BLDG. 283, FORT MONMOUTH, NJ 07703-5506
PROGRAM MANAGER, WIN-T, ATTN: SFAE-C3S, (COL SIOMACCO), BLDG 744,
FORT MONMOUTH, NJ 07703-5506
PROGRAM MANAGER, TRCS, ATTN: SFAE-C3S-TRCS-OPM, BLDG 456,
FORT MONMOUTH, NJ 07703-5502
PROGRAM MANAGER, JOINT TACTICAL RADIO SYSTEM, ATTN: SFAE-JT, 1700 N
MOORE ST. ROSSLYN, VA 22209
PROGRAM MANAGER, MSA, ATTN: SFAE-C3S-MSA, BLDG 909,
FORT MONMOUTH, NJ 07703-5508
PROGRAM MANAGER, INTEGRATED LOGISTICS SYSTEMS (ILS),
ATTN: SFAE-PS-RS, 800 LEE AVENUE, FORT LEE, VA 23801-1718
COMMON HARDWARE SOFTWARE, ATTN: SFAE C3S-CHS,
FORT MONMOUTH, NJ 07703-5402
PRODUCT MANAGER, DEFENSE DATA NETWORKS ATTN: AMCPM-SWD,
BLDG 283, SQUIER HALL, FT MONMOUTH, NJ 07703-5605
OPERATIONS TACTICAL ARMY DATA SYSTEMS, ATTN: SFAE-CC- MVR-S,
FORT MONMOUTH, NJ 07703-5000

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HQ AETC/DO, 1 F STREET SUITE #2, RANDOLPH AFB, TX 78150-4325

HQ AMC/SC, 203 W LOSEY ST, ROOM 3600, SCOTT AFB IL 62225-5219

HQ AMC/DO, 402 SCOTT DR UNIT 3A1, SCOTT AFB IL 62225-5302

HQ PACAF/SC, 25 E ST. SUITE C-310, HICKAM AFB, HI 96853-5409

HQ PACAF/DOQ, 25 E ST., SUITE G322B, HICKAM AFB HI 96853-5426

HQ USAFE/SC, UNIT 3050 BOX 125, APO AE 09094-0125

HQ USAFE/DOQ, UNIT 3050 BOX 15, APO AE 09094-5015

HQ ACC/DR, 204 DODD BLVD SUITE 150, LANGLEY AFB, VA 23665-2777

HQ ACC/SC, 180 BENEDICT AVE, SUITE 209, 23665-1993

HQ USAF/XO ATTN:XORI, 1480 AIR FORCE PENTAGON, WASHINGTON DC
20330-1480 AND XOCE and XORD

HQ USAF/SC ATTN: SCMO, 1250 AIR FORCE PENTAGON, WASHINGTON DC
20330-1250

SAF/AQIC, 1060 AIR FORCE PENTAGON, ARLINGTON, VA, 20330-1060

ELECTRONIC SYSTEMS CENTER (ESC)/DI, 5 EGLIN ST. HANSCOM, AFB, MA 01731

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APPENDIX C**

ORD SUPPORTING ANALYSIS

1. Department of Defense Joint Analyses and Decisions.

a. Mission Need Statement for the Joint Tactical Radio, Joint Requirements Oversight Council, Joint Chiefs of Staff, August 21, 1997.

b. Memorandum, Under Secretary of Defense for Acquisition and Technology, SUBJECT: Decision Memorandum for the Programmable Modular Communications System (PMCS), September 11, 1997.

c. Memorandum, Under Secretary of Defense for Acquisition and Technology, SUBJECT: Joint Tactical Radio System (JTRS) Management Implementation Plan, December 19, 1997.

d. Memorandum, Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, SUBJECT: Radio Acquisitions, August 28, 1998.

e. Memorandum, Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, SUBJECT: Tactical Radios, August 28, 1998.

f. Memorandum, Under Secretary of Defense for Acquisition, Technology, and Logistics, SUBJECT: Joint Tactical Radio Systems (JTRS) Operational Requirements Document (ORD) Update, JROCM 043-01, March 1, 2001.

g. Memorandum, Under Secretary of Defense for Acquisition, Technology, and Logistics, SUBJECT: Joint Tactical Radio System (JTRS) Defense Acquisition Board (DAB) Program Review, August 2, 2001.

2. US Army Analyses and Decisions.

a. Memorandum, Commanding General, US Army Signal Center, SUBJECT: Operational Concept Statement for Multiband Radio, April 4, 1991.

b. Memorandum, Deputy Chief of Staff for Operations and Plans, Department of the Army, SUBJECT: Mission Need Statement for the Future Digital Radio, May 13, 1996.

c. Memorandum, Deputy Chief of Staff for Operations and Plans, Department of the Army, SUBJECT: Mission Need Statement (MNS) for the Future Digital Radio (FDR), May 13, 1996.

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d. Memorandum, US Army Training and Doctrine Command Systems Manager for Tactical Radios, SUBJECT: Joint Tactical Radio System (JTRS) Requirements Quick Analysis October 1998.

e. Study Report, Analysis of Alternatives for Transition of the Army to a Joint Tactical Radio System Functional Architecture, US Army Signal Center, December 10, 1999.

f. Programmable Modular Communications Systems Analysis of Alternatives Phase 1, January 30, 2002

3. US Navy Analysis and Decisions: TBP.

4. US Air Force Analysis and Decisions: TBP.

5. US Marine Corps Analysis and Decisions: TBP.

6. Other Analysis and Decisions: TBP.

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APPENDIX D**

JTR SYSTEM CRYPTOGRAPHIC SUMMARY

The JTR Sets identified in this ORD operate with or interface to the following cryptographic systems/equipment as applicable to the set configuration.

System/Version	Crypto Device	Algorithm	Voice/Data Type	Fill Devices	Key Interface
Wideband Voice	KY-68	Saville	CVSD Voice	KYK-13 KOI-18 KYK-15 AN/CYZ-10 DTD	DS-102
	STE		LPC-10 Voice		KSD-64/DS-101
	KY-57/58	Saville	CVSD Voice		DS-102
Narrowband Voice	KYV-5 TACTERM	Saville			DS-102
	KY-99/100 MINTERM, AIRTERM (ANDVT / KY- 57/58 Family)	Saville.			DS-102
	STU-III Family	FF Saville			Used both for non-secure office telephone and earlier model secure telephones.
Low Speed Digital Data (<T1)	KG-84A/C (KIV-7HS)	Saville			DS-102
	KG-94A (KIV-19)	Saville/Baton			DS-102
	STE and KY-57/58	FF Saville			KSD-64 DS-102
	KYV-5 TACTERM	Saville			DS-102
	KY-99/100 MINTERM, AIRTERM (ANDVT / KY- 57/58 Family)	Saville			DS-102

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	KY-68	Saville			DS-102
	KGR-96				
	KG-87				
	KWT-46 KWR-46				DS-101 DS-102
Medium Speed Digital Data	KG-175 TACLANE for ATM	Baton			KSD-64 DS-102
Unique Systems	KG-40A (TADIL A, LINK-11)	Thorton			Thorton Smart Fill DS-102
	KGV-8 and KGV-11 Families (Netted TDMA Crypto)	Thorton			Thorton Smart Fill DS-102
	KGV-10	Thorton			DS-102
	PPS- SM/SAASM GPS				To access the PPS of the Global Positioning System.
	SINCGARS Family	Saville			DS-102
	DES				
	KIT-1C/KIR – 1C (Mark XII/A STANAG 4193, Part VI)				
Present Cryptography	CTIC	Thorton			Thorton Smart Fill DS-102
	INDICTOR	Saville Cordoba			DS-102
New Cryptography	BATON				
	CRAYON				
Common Fill Devices	CI-13	Distributed microprocessor/ microcomputer system providing an operator console and COMSEC custodian console.			Provides key distribution between the EKMS and a diverse array of End Cryptographic Units.
	CYZ-10	Accordian			Thorton Smart

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					Fill DS-101 DS-102 RS-232 NSA 87-27
	DS 101				
	KOI-18	None			DS-102
	KOK-22				DS-102 DS-101 RS-232 NSA 87-27
	KOK-13	Thorton			Thorton Smart Fill DS-102
	KYK-13	None			DS-102
	KYK-15	None			DS-102

TABLE AD-1 JTR SYSTEM CRYPTOGRAPHIC SUMMARY

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APPENDIX E

JOINT INFORMATION EXCHANGE REQUIREMENTS MATRIX (OV-3)

JTRS ORDER #	JOINT INFORMATION EXCHANGE REQUIREMENT MATRIX UJTL	EVENT <i>Causes Info To Be Exchanged</i>	INFO CHARACTER <i>How and What</i>	SENDING NODE	RECEIVING NODE	Critical	FORMAT <i>DATA VOICE and/or VIDEO</i>	TIMELINES <i>S Expressed in Secs/Mins (See App F)</i>	CLASS <i>Unclass, Secret, TS</i>	EXAMPLE SYSTEMS Example Nodes and Systems That Must Support Information Exchange with JTRS	REMARKS
1	OP 5.1.1 COMM OPER INFO	Tactical and Operational Planning and Execution Information Exchange	Info Request, Transfer & Receipt (SITREPS, OPORDERS, ATO, ETC.)	Service/Joint JTR Node	Service /Joint JTR Node	Yes	Data Voice	IAW Table AF-1 (Cat I - IV)	Secret/ TS/ TS-SCI	Joint HQs, Army Units, Air Force Units, Marine Units, Navy Units	Interchange of information between Joint & Service component HQs and between Service component units using JTR nodes with the same waveforms. Ref 4a(1)(a)
2	OP 5.1.1 COMM OPER INFO	Tactical and Operational Planning and Execution Information Exchange	Info Request, Transfer & Receipt (SITREPS, OPORDERS, ATOs, etc.)	Coalition/ Allied Node	Service /Joint JTR Node	Yes	Data Voice Video	IAW Table AF-1 (Cat I - IV)	Secret	Coalition and Allied units	Interchange of information between Coalition/Allied HQs & units and US Service component & Joint HQs nodes with the same waveforms.
3	OP 5.1.1 COMM OPER INFO	Tactical and Operational Planning and Execution Information Exchange	Info Request, Transfer & Receipt (SITREPS, OPORDERS, ATOs, etc.)	Service/ Joint JTR Network Node	Other Service /Joint Network Node	Yes	Data Voice Video	IAW Table AF-1 (Cat I - IV)	Secret	Networks identified in SV and OV diagrams	Transfer of information from a Joint/Service JTRS network to a dissimilar Joint/Service network via a JTR node acting as a gateway network of the same communications mode and similar transfer rates).
4	OP 5.1.1 COMM OPER INFO	Tactical and Operational Planning and Execution Information Exchange	Info Request, Transfer & Receipt (SITREPS, OPORDERS, ATOs, etc.)	Service/ Joint JTR Network Node	Commercial and Allied/Coalition Network Node	Yes	Data Voice Video	IAW Table AF-1 (Cat I - IV)	Secret	Commercial, Allied, Coalition Networks and Other Government Agencies	Transfer of information from a Joint/Service JTRS network to a dissimilar Commercial, Allied/Coalition, or other government agency network via a JTR node acting as a gateway (networks of the same communications mode and similar transfer rates).

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5	OP 5.1.2 MANAGE MEANS OF COMMUNICATING OPER INFO	Network Planning, Engineering, and Management Data Exchange	Network Planning & Status Reports	JTR Network Node	Joint or Service Network Management System	Yes	Data Voice	IAW Table AF-1 (Cat III)	Secret	JNMS, INMS, WIN- T NMS, and other identified Service and Joint network management systems.	Each JTRS network element is capable of providing status information to Service and Joint network management systems.
6	OP 5.1.2 MANAGE MEANS OF COMMUNICATING OPER INFO	System Performance and Monitoring Information Exchange	<u>Network Planning & Management Reports, Requests, Changes/</u> Network Configuration Changes/ Spectrum Utilization reports/ Fault Management Status Report/ Problem Detection/ Problem Correction/ Performance Status	Service and Joint , Network Management Node	JTR Network Node	Yes	Data Voice	IAW Table AF-1 (Cat II)	Secret	JNMS, INMS, WIN- T NMS, and other identified Service and Joint network management systems.	JTRS network is capable of being reconfigured by a network manager through identified Joint/Service network management systems (e.g., JNMS, INMS, WIN-T NMS).
7	OP 5.1.1 COMMUNICATE OPERATIONAL INFORMATION	Tactical and Operational Planning and Execution Information Exchange	<u>Info Request/</u> Route and Retransmit RF Signal Strength/ Data/voice transport status/ Bandwidth requirement	JTR Node	Legacy Radio Node	Yes	Data to Data, Voice to Voice, Video to Video	IAW Table AF-1 App. E (Cat I - IV)	Secret	SINGARS, ESIP, EPLRS, HAVEQUICK II, UHF SATCOM DAMA/DASA and Wideband Networking Waveform	KPP waveforms of same communications mode, similar data rates, and compatible cryptographic equipment will Route and Retransmit. Ref 4a(1)(a), (f), (i)
8	OP 5.1.1 COMMUNICATE	Tactical and Operational	<u>Info Request/</u> Route and	Legacy Radio Node	JTR Node	Yes	Data to Data,	IAW Table AF-1 App. E	Secret	SINGARS, ESIP, EPLRS,	Same as above.

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	OPERATIONAL INFORMATION	Planning and Execution Information Exchange	Retransmit RF Signal Strength/ Data/voice transport status/ Bandwidth requirement				Voice to Voice, Video to Video	(Cat I - IV)		HAVEQUICK II, UHF SATCOM DAMA/DASA and Wideband Networking Waveform	
9	OP 5.1.1 COMMUNICATE OPERATIONAL INFORMATION	Tactical and Operational Planning and Execution Information Exchange	<u>Info Request/</u> Route and Retransmit RF Signal Strength Data/voice transport status/ Bandwidth requirement	Other Legacy Radio Node	JTR Node	Yes	Data to Data, Voice to Voice, Video to Video	IAW Table AF-1 App. E (Cat I - IV)	Secret	Other Legacy Waveforms not noted in Tables 4-2	Non-KPP waveforms from Table 4-2 of same communications mode, similar data rates, and compatible cryptographic equipment will Route and Retransmit. Ref 4a(1)(a), (f), (i)
10	OP 5.1.1 COMMUNICATE OPERATIONAL INFORMATION	Tactical and Operational Planning and Execution Information Exchange	<u>Info Request/</u> Route and Retransmit RF Signal Strength/ Data/voice transport status/ Bandwidth requirement	JTR Node	Other Legacy Radio Node	Yes	Data to Data, Voice to Voice, Video to Video	IAW Table AF-1 (Cat I - IV)	Secret	Other Legacy Waveforms not noted in Domain Supported Waveform Table.	Same as above.
11	OP 5.1.2 MANAGE MEANS OF COMMUNICATING OPER INFO	Tactical and Operational Planning and Execution Information Exchange	<u>Info Request/</u> Timing and Location Report	GPS	JTR Network Node	Yes	Data Voice	IAW Table AF-1 (Cat I)	Secret	NA	Ref para 4a(1)(o)
12	OP 5.1.2 MANAGE MEANS OF COMMUNICATING OPER INFO	Tactical and Operational Planning and Execution Information Exchange	<u>Response to Info Request/</u> Timing and Location Report	GPS	JTR Network Node	Yes	Data Voice	IAW Table AF-1 (Cat I)	Secret	NA	Ref para 4a(1)(o)
13	OP 6.3.2 PROTECT INFORMATION SYSTEMS IN	System Performance and Monitoring	<u>Info Request/</u> Security Status Report/ Problem Detection/	Service and Joint Information Assurance	JTRS	Yes	Data Voice	IAW Table AF-1 (Cat I - II)	Secret	Joint or Service IA Systems	Ref para 4c(9)

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	THEATER OF OPERATIONS	Information Exchange	Problem Correction/ Verification of Instruction	(IA) System							
14	OP 6.3.2 PROTECT INFORMATION SYSTEMS IN THEATER OF OPERATIONS	System Performance and Monitoring Information Exchange	<u>Info Request/</u> Security Status Report Problem Detection/ Problem Correction/ Verification of Instruction	Coalition and Allied Information Assurance (IA) System	JTRS	Yes	Data Voice	IAW Table AF-1 (Cat I – II)	Secret	Allied and Coalition IA Systems	Ref para 4c(9)
15	OP 6.3.2 PROTECT INFORMATION SYSTEMS IN THEATER OF OPERATIONS	Tactical and Operational Planning and Execution Information Exchange	Configuration Change Request/ OTAR Sending of Rekeying Material	JTR Node	EKMS	Yes	Data	IAW Table AF-1 (Cat II)	Secret	EKMS	Ref para 4a(2)(d), (e), 5c(5)
16	OP 6.3.2 PROTECT INFORMATION SYSTEMS IN THEATER OF OPERATIONS	Tactical and Operational Planning and Execution Information Exchange	Response to Configuration Change Request/ OTAR Sending of Rekeying Material	EKMS	JTR Node	Yes	Data Voice	IAW Table AF-1 (Cat II)	Secret	EKMS	Ref para 4a(2)(d), (e), 5c(5)

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APPENDIX F**

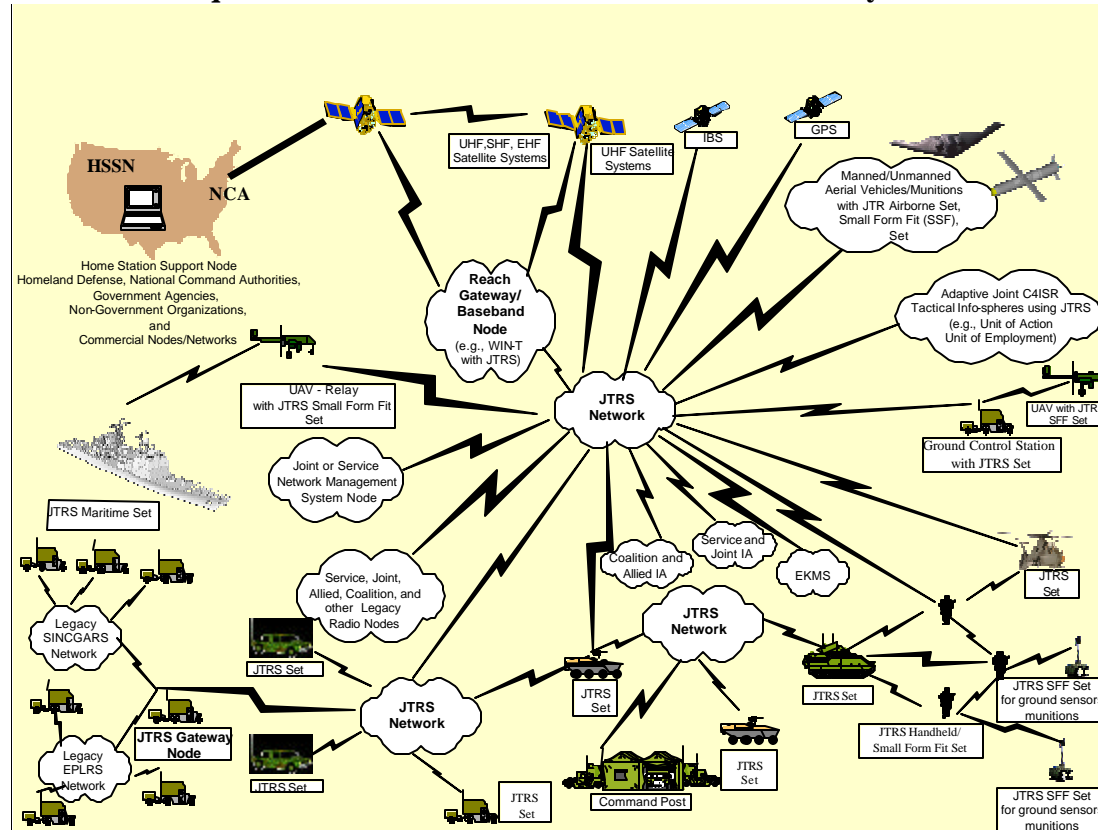
INFORMATION TYPES	% COMPLETION WITHIN DATA INFORMATION EXCHANGE REQUIREMENT		DATA INFORMATION EXCHANGE REQUIREMENT (Size I)	
	Threshold		Threshold	Objective
CATEGORY I				
Survival Information (includes but is not limited to Call for Fire, Theater Air and Missile Defense, Nuclear Strike/Nuclear, Biological, Chemical Strike/Severe Weather Warning,)	Block 1 95%	Block 2 99.9%	≤ 5 sec	< .5 sec
CATEGORY II				
Time-Sensitive Work Information (includes but is not limited to Friendly, Enemy, Terrain, Weather, Gray Picture)	95%		< 8 sec	< 1 sec
CATEGORY III				
Aggregate Routine Information (includes but not limited to intelligence processing, correlated intelligence, correlated friendly, OPORD)	95%		< 30 sec	< 15 sec
CATEGORY IV				
Non-Time-Sensitive Information (includes but is not limited to, administrative, logistics, database replication)	95%		< 15 min	< 8 min

TABLE AF- 1 SPEED OF SERVICE

(Note: IAW Global Information Grid Capstone Requirements Document, JROCM 134-01, dated 30 August 2001, Table 4-1)

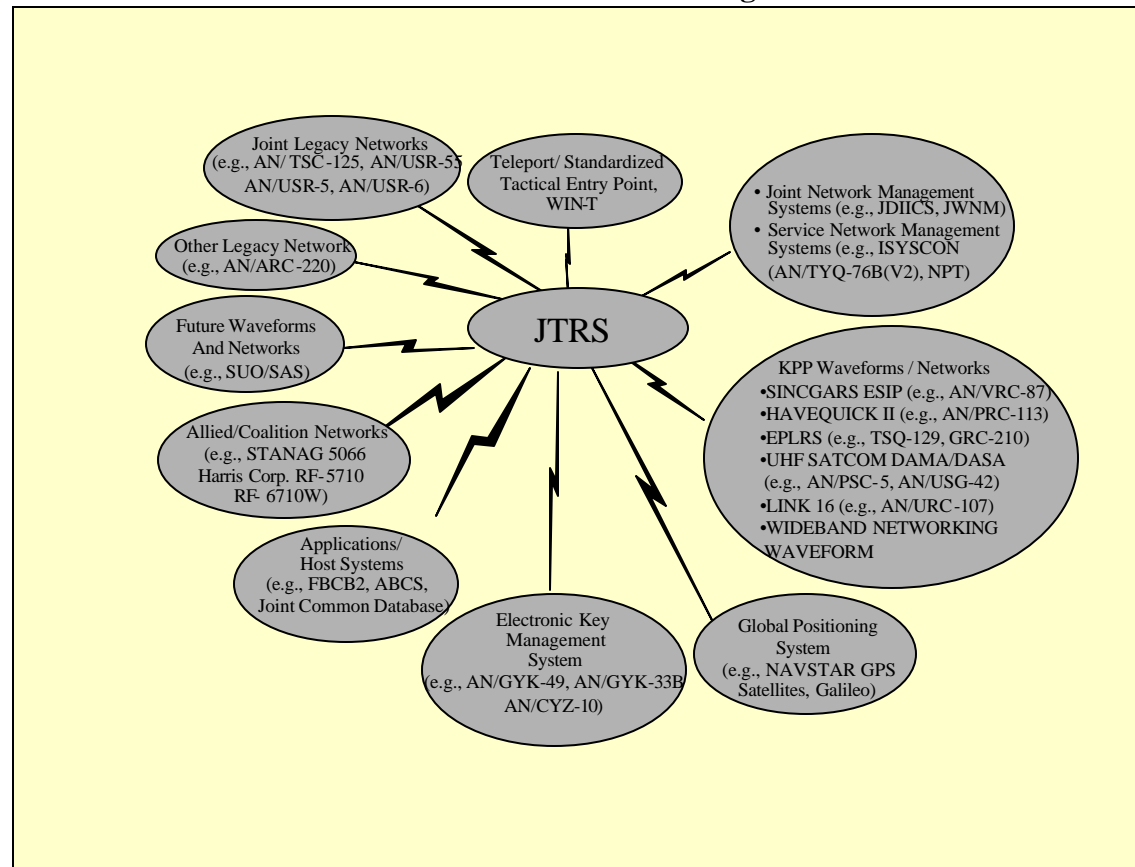
JTRS OPERATIONAL OVERVIEW (OV-1)

Includes presentation of top-level view of the JTR System interoperability
Requirements with other current and known future systems.



JTR SYSTEM OVERVIEW (SV-1)

Depicts systems that support exchanging of information between JTRs and other nodes. Exchange includes unless otherwise



specified in the ORD voice, video, and data.

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APPENDIX I**

GIG CRD to JTRS Crosswalk

CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
CHAPTER I: GENERAL DESCRIPTION OF OPERATIONAL CAPABILITY			
GIG Reference	LB.3	Does the GIG CRD appear in the Related Documents section?	1b
Operational Concept	LED.3	If the OV-1 depicts information exchange relationships, are the producer, user, and command node entities identifiable?	App G
		Does the operational concept include external information exchange?	YES
GIG Implementation Guidelines	IFE	Have each of the following GIG implementation guidelines been considered and applied in the ORD as appropriate?	YES
		GIG implementation done in accordance with the standards included in the most current version of the <i>DoD JTA</i> ?	4.a.1.b 5.c.2
		All new Command, Control, Communications, Computers and Intelligence (C4I) emerging systems and upgrades to be fielded as level 6 DII COE compliant with the goal of achieving level 8 compliance?	5.c.2
		System is either standards-based or employs commercial-off-the-shelf (COTS) technologies to: - Facilitate joint, allied, and coalition interoperability? - Simplify integration? - Reduce both long and short-term costs?	1.f 4.a.1.b 1d; 5.c.2 8.c
		System is to be scalable, affordable, sustainable and extensible with respect to its functionality?	4.a.3.a 4.a.1.b 4.a.2.a
		System is designed to accommodate change and facilitate the integration of future systems and technologies as they evolve?	1.f
		System is consistent with current DoD, IC, and commercial efforts regarding data and metadata standardization?	5.c 5.c.7
		Additional manpower requirements are minimized?	5.e.1
		Reliability, availability, survivability, and maintainability features of the system are designed to support all functions necessary to meet the requirements documented in Chapter IV, including the ability to recover from critical failures?	5.c.2 4.a.1.j 4.d
		Emphasis is placed on reducing the complexity, time, and cost of training?	1.2.2 4.e.2.a
		Software design is aimed at enhancing interoperability and commonality among GIG-enabled systems?	1.e.2 4.a.1.b

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GIG CRD to JTRS Crosswalk

GIG CRD to JTRS Crosswalk			
CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
GIG Implementation Guidelines	I.E	System designed using an open systems approach and adhering to applicable standards within the JTA?	1.c.2 4.a.1.b
		Bandwidth and throughput requirements along with implications to strategic, fixed, theater and tactical architectures are considered?	1.e.1 1.e.1.f.3 1.c.2
		United States Imagery and Geo-spatial Information Service (USIGS) standards used for the processing and display of imagery and geospatial data across the GIG The use of NIMA standard military data is specified to be used where possible to support common operational displays of geopolitical boundaries among the commands?	5.h
		System will be developed, tested, and deployed in a manner that is compliant with all appropriate treaties and international agreements?	5.c.7
		System will be tested and certified for interoperability IAW Joint Interoperability Test Command (JITC) procedures?	5.c.2
		System enables users to operate in a multilingual environment to overcome the inherent language barriers of multinational and coalition operations?	4.a.1.r
		System mitigates security risks and meets all current security provisions articulated in appropriate DoD and IC policies, procedures, and instructions including DoDD 8500.aa?	5.c.9
		System uses standards-based rather than system-unique security mechanisms?	5.c.9
		ORD considers ongoing developments and evolving specifications in the following areas (as applicable): - Joint Operational Architecture (JOA)? - Nuclear C2 Systems Technical Performance Criteria (NTPC)? - GIG Architecture? - Mission Information Management (MIM) Architecture?	YES
		Time-phased requirements developed in ORD, with associated objectives and thresholds, IA W DoDI 5000.2?	YES
CHAPTER II: THREAT			
Threat to be Countered	II.	If information exchange is fundamental to the ORD, does Chapter II mention Information Operations, Computer Network Attack, Computer Network Exploitation, Electronic Warfare, and Electromagnetic Pulse?	2.b

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GIG CRD to JTRS Crosswalk

CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
CHAPTER III: SHORTCOMINGS IN MISSION AREA AND EXISTING SYSTEMS			
Shortcomings	III	Does the ORD describe shortcomings or absence of existing capabilities and systems to fulfill the needs of the GIG functions described in Chapter I? As applicable, are GIG shortcomings addressed such as: lack of interoperable applications; limited ability to rapidly catalog, search, and retrieve required information; limited ability to effectively and efficiently use existing RF spectrum; limited ability to move digital information seamlessly; lack of asset visibility resulting in limited ability to effectively manage a common user network; limited means to prioritize information and establish profiles; limited ability to support multilevel security operations?	3
CHAPTER IV: CAPABILITIES REQUIRED – TRANSPORT FUNCTION			
Switching/ Routing/ Transmission	IV.B.4b	System providing switching, routing, and transmission control capabilities/ mechanisms shall be fully interoperable and work seamlessly across the entire GIG in accordance with <i>DoD JTA (Threshold)?</i>	1.e.1.c
Spectrum Supportability/ Electromagnetic Environmental Effects	IV.B.4c	System shall optimize use of the available electromagnetic spectrum through efficient frequency reuse and advanced modulation, compression and filtering techniques, and shall comply with DoD, National and International spectrum management policies as applicable (Threshold)? System shall be mutually compatible with other systems, including allied and coalition systems, in the operational environment and shall not be degraded by electromagnetic environmental effects (Objective)?	4.a.1.a 4.a.1.r 4.a.4.c 5.c.3 5.c.5 4.d.4
Quality of Service	IV.B.4d	Transport system shall provide QoS capabilities that ensure that information identified as priority is delivered ahead of regular traffic 99% of the time (Threshold, KPP) and 99.9% of the time (Objective, KPP)? Required QoS factors include: <ul style="list-style-type: none"> • Prioritization. End users shall be able to assign priority to information targeted for transport (Threshold)? • Response Time. All transport capabilities shall be designed to meet or exceed customer stated response times (Threshold)? • Precedence. Data shall receive expedited handling during transport in accordance with the commander's policy and user assigned priority (Threshold)? • Reliability. Delivery of information shall be guaranteed in accordance with its assigned broadcast level (Threshold)? • Latency. It shall be possible to deliver information in real and/or near real time as required (Threshold)? 	4.d.17
Information Integrity	IV.B.4e	System shall maintain and guarantee during transport the integrity of all information elements exchanged throughout the GIG to enable user confidence; information integrity shall be 99.99% (Threshold, KPP) and 99.999% (Objective, KPP).	4.d.16
Standards	IV.B.4f	To ensure system interoperability across the GIG and to support uninterrupted service, all GIG transport capabilities shall be standards-based using <i>DoD JTA</i> and DoD CIO prescribed standards, as applicable (Threshold)?	4.a.1.b 5.c.2

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GIG CRD to JTRS Crosswalk

CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
Connectivity	IV.B.4g	Transport system shall provide connectivity on demand to all fixed and deployed locations/users (Threshold)? Transport systems shall have the ability to maintain network connectivity on the move to meet Service/JTF requirements in all warfighting environments (afloat, sub-surface, airborne, in space, on the ground) (Objective)?	1.a. 1.e.1 1.e.1.f.2 4.a.3.e 4.a.3.d 4.a.3.g 4.a.3.k
Capacity	IV.B.4h	With minimal exceptions, GIG transport capacity shall be viewed as an open system that is available to transport information from all domains utilizing unicast, multicast, and broadcast techniques to provide information on demand to the warfighter/decision maker (Threshold)? Transport system shall have the reserve capacity to accommodate surge loading and support multiple military operations as described in Defense Planning Guidance (Objective)?	1.c.2 4.a.1.b 1.e.1.c 1.e.a.f 4.a.3.c
Technology Insertion	IV.B.4i	To effectively keep pace with advances in technology that have the potential to render existing systems obsolete shortly following acquisition, the GIG shall enable and support the seamless and efficient insertion and incorporation of emerging (future) technologies into the transport domain (Threshold)?	1.f
Security	IV.B.4j	System shall provide link and transmission security based on the level of risk acceptable to the user, and the GIG security architecture shall support use of clear headers if and when necessary (Threshold)?	4.a.2.c
Robustness	IV.B.4k	To avoid any single point of failure, the GIG shall use multiple connectivity paths (not susceptible to the same threat) and media (Threshold)?	4.a.1.a 4.a.1.e
Scalability	IV.B.4l	Transport capability shall be scalable and adaptable to meet dynamic needs of users (Threshold)?	4.3.m 4.a.3.f
Survivability	IV.B.4m	Transport system shall be protected against all potential threats commensurate with the operating environment and the criticality of the information being transported, and shall ensure connectivity through the total threat environment (i.e. conventional and nuclear) (Threshold)?	1.c.2 4.a.1.b 4.a.1.h 4.a.3.a
Availability/Reliability	IV.B.4n	Transport capabilities shall be available to provide reliable information exchange services to the warfighter/decision maker on demand and shall be responsive to the criticality of the information to be exchanged (Threshold)?	4.c.1
Tactical Deployability	IV.B.4o	Transport system supporting tactical forces shall minimize lift requirements and be transportable using existing JTF/Service notional lift capability (Threshold)?	5.g
Transport Element Status	IV.B.4p	All transport elements (e.g., switches, routers, etc.) shall be capable of providing status changes to network management devices by means of an automated capability in near real time 99% (Threshold, KPP) and 99.9% (Objective KPP) of the time? Network Management cannot exceed the channel capability.	4.a.4.c
Secure Voice with Allied and Coalition Forces	IV.B.4r	Secure voice cryptography shall be provided to or developed with allied forces that enable interoperability (Threshold)? Secure voice systems shall be interoperable with coalition forces (Objective)? A secure voice system shall be able to be provided to coalition forces that are interoperable with the U.S. version using coalition releasable technology (Threshold)?	4.a.2.a 4.a.2.j

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GIG CRD to JTRS Crosswalk

CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
Information Over Tactical Data Links	IV.B.4s	Systems transporting/exchanging information over tactical data links (TDLs) shall use one or more members of the J-Series Family of Tactical Data Links IAW the DoD Joint Tactical Data Link Management Plan (JTDLMP) and the DoD Joint Technical Architecture (JTA) (Threshold)?	4.a.1.a
CHAPTER IV: CAPABILITIES REQUIRED – HUMAN-GIG INTERACTION (HGI) FUNCTION			
Output/Input	IV.B.5b	System's HGI shall present to and accept information from humans using a combination of visual, aural, tactile, and/or other sensory methods (Threshold)?	5.e.3
Feedback	IV.B.5c	System's HGI shall provide unobtrusive confirmations of user input and actions, to include implicit visual, aural and/or tactile feedback in response to user actions, as well as, explicit notifications that entered data was properly entered and accepted by the system, and/or errors were detected (Threshold)?	4.a.1.j 5.d.2
Specialized Environments	IV.B.5d	System's HGI shall functionally accommodate use in a nuclear, biological, and chemical (NBC) or other specialized operating environment as designated by mission needs (Threshold)?	4.d.7
Usability	IV.B.5e	System's HGI shall be useable by all end user skill levels in the aspects of learnability, flexibility, and tailorability, which shall be verified by iterative user testing (Threshold)?	5.e.3
Task Efficiency	IV.B.5f	System's HGI shall provide decision aids and tools as necessary to maximize users' efficiency and performance of their task, with operator aids designed to support specific user tasks and tailored to the information needs of the targeted user (Threshold)?	5.e.3
User-Centered Design	IV.B.5g	A user-centered design process and user testing shall be employed for the system's HGI to ensure that the end-user's cognitive framework and expectations are accommodated by the system design (Threshold)?	5.e.3
Standards	IV.B.5h	System's HGI shall be compliant with the DoD JTA (Threshold)?	5.e.3
Neutrality	IV.B.5i	System's HGI presentation format shall not change the intended meaning of the information being presented; thus all data shall be clearly labeled to avoid misinterpretation or confusion (Threshold)?	5.e.3
Ergonomics	IV.B.5j	To minimize user fatigue and discomfort, the system's HGI hardware and software elements shall be ergonomically designed with respect to the user's operating environment (Objective)?	5.e.3
Errors	IV.B.5k	System's HGI shall be designed to minimize user input/mechanical/perception errors (Threshold)?	5.e.3
On-line help	IV.B.5l	System's HGI shall provide context-sensitive on-line help at the user's request, thus eliminating/reducing the need for off-line support or documentation that may distract the user from the intended task (Threshold)?	5.e.2.c
CHAPTER IV: CAPABILITIES REQUIRED – NETWORK MANAGEMENT (NM) FUNCTION			
Situational Gig End to End Awareness	IV.B.6.a. (2)	To accomplish GIG end-to-end situational awareness, system shall have the NM capability of automatically generating and providing an integrated/correlated presentation of network and all associated network assets (Threshold)?	FDD 4.b

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GIG CRD to JTRS Crosswalk

CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
Dynamic, Predictive Planning	IV.B.6.a. (3)	System shall have the NM capability to perform dynamic, predictive planning by gathering, storing and using knowledge about GIG assets/resources, to optimize their utilization (Threshold)? System shall have the NM capability to create/modify/distribute network plans and orders IAW user requirements (Threshold)?	FDD 4.2 FDD 4.3
Distributed and Partitioned Network Control	IV.B.6.a. (4)	System shall have the NM capability to rapidly transfer control of one or more objects or groups of varying size, and reestablish control when relinquished without hindering end-to-end visibility by the senior network manager, while maintaining continuous control (Threshold)?	FDD 4.1
Remote Object and Network, Control and Configuration	IV.B.6.a. (5)	System shall have a NM capability that leverages existing and evolving technologies and has the ability to perform remote network device configuration/reconfiguration of objects that have existing DoD JTA management capabilities (Threshold)?	4.a.4
Network Status	IV.B.6.a. (6)	System shall have an automated NM capability to obtain the status of networks and associated assets in near real time 99% (Threshold, KPP) and 99.9% (Objective, KPP) of the time.	4.a.4.c
Automated Fault Management	IV.B.6.a. (7)	Systems shall have the NM capability to perform automated fault management of the network, to include problem detection, fault correction, fault isolation and diagnosis, problem tracking until corrective actions are completed, and historical archiving (Threshold)?	FDD 4.5.2
CHAPTER IV: CAPABILITIES REQUIRED – INFORMATION ASSURANCE (IA) FUNCTION			
Information Integrity and Availability	IV.B.6.c. (2)	System shall be robust, survivable and capable of rapid restoration, to support IA across the GIG (Threshold)? System shall have an IA capability to define, control, and defend enclave boundaries (Threshold)? System shall have an IA capability to provide timely, reliable access to processes and data even in the event of a denial of service attack (Threshold)? System shall have an IA capability to ensure information and process integrity throughout the system (during storage, processing, transmission and presentation) to prevent unauthorized or unintended changes, in accordance with mission specific criteria (Threshold)?	4.c.1 5.c.9
Prevent Opportunity to Attack	IV.B.6.c. (3)	System shall be developed in accordance with IA Defense in Depth standards (CJCSI 6510.01C) to prevent or at least minimize the opportunity for attack; and shall have, in the event of an attack, the IA capability to immediately define, detect and respond appropriately to anomalies/attacks/disruptions from external threats, internal threats and natural causes (Threshold)?	5.c.9
Access Control	IV.B.6.c. (4)	System shall have an IA capability that provides adequate protection from user attempts to circumvent system access controls, accountability or procedures for performing unauthorized system operations (Threshold)?	5.c.9
Detection and Responses	IV.B.6.c. (5)	System shall incorporate a detection, reporting and response IA infrastructure that enables rapid detection of and reaction to anomalous events, and enables operational situation awareness and responses (Threshold)?	5.c.9

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GIG CRD to JTRS Crosswalk

CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
Security Domains	IV.B.6.c. (6)	System shall have an IA capability to maintain 100% information integrity when operating at different security levels and comply with existing security requirements (Threshold, KPP)? System shall have an IA capability for operating within each security domain and across any security domains while ensuring that all operations are comply with existing security requirements conducted within appropriate security measures (Threshold)?	5.c.9
Authentication/ Confidentiality/ Non-repudiation	IV.B.6.c. (7)	System shall meet and maintain minimum IA Defense in Depth standards, including certification and accreditation IAW DITSCAP process (e.g., <i>CJCSI 6510.01C</i> , <i>DoDI 5200.40</i>) (Threshold/Objective, KPP)? System shall utilize/interoperate with the security management infrastructure (e.g., key management and DoD public key infrastructure) (Threshold)? System shall provide proof of information origin and receipt as required (Threshold)?	5.c.9
Confidentiality Services	IV.B.6.c. (8)	System shall have an IA capability that ensures information is not disclosed to unauthorized entities or processes on the network and infrastructure to protect against passive intercept attacks, including against unauthorized disclosure of information and traffic analysis (Threshold)? System shall have an IA capability to share data among users operating at different and /or multiple security levels as appropriate, and at the same time protect the data from unauthorized disclosure (Threshold)?	5.c.9
Content-Based Encryption	IV.B.6.c. (9)	System shall have an IA capability to perform content-based encryption of information objects at the host instead of depending on the bulk encryption of the entire network in order to secure the information (Threshold), and this capability shall also be available for operations involving allied and coalition forces (Objective)?	5.c.9
CHAPTER IV: CAPABILITIES REQUIRED – INTEROPERABILITY			
Interoperability	IV.C	System shall satisfy all critical IER attributes to the threshold level (Threshold, KPP) and satisfy all IER attributes to the objective level (Objective, KPP)?	4.a.1.r

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APPENDIX J

CID CRD to JTRS Crosswalk			
CRD Section Heading	CRD Para #	CROSSWALK ITEMS	YES, NO, N/A
CID FoS Operational Concept	I.C.4	Each CID system must also demonstrate its compatibility through its host system and tactical data networks with the global information grid through which it will further share and distribute CID data/information.	1.b
UJTL OP 2.2.5 Collect Target Information	Table D-1	UJTL: applicable (yes/no) Event(s): that apply to system ORD Information Characteristics: that apply to system ORD Sender Node: map to system ORD Receiver Node: map to system ORD Critical: Yes Data Integrity: 99.99% (T). 99.999% (O). Timeliness: See Attribute 8 in Table D-1	NA ORD supports Information Integrity 4.d.16
UJTL TA 5.1 Acquire and Communicate Information and Maintain Force Reporting	Table D-1	UJTL: applicable (yes/no) Event(s): that apply to system ORD Information Characteristics: that apply to system ORD Sender Node: map to system ORD Receiver Node: map to system ORD Critical: Yes Data Integrity: 99.99% (T). 99.999% (O). Timeliness: See Attribute 8 in Table D-1	NA ORD supports Information Integrity 4.d.16
Electromagnetic Compatibility	IV.D.1	All C4ISR systems that support the exchange of CID information must be mutually compatible with other systems in the electromagnetic environment and must not be degraded below operational performance requirements by electromagnetic environmental effects.	4.d.4
Spectrum Management Compliance	IV.D.2	All C4ISR systems that support the exchange of CID information must comply with applicable DoD, National, and International spectrum management policies and regulations.	5.c.5
Spectrum Documentation and Certification	IV.D.3	All proposed C4ISR systems that support the exchange of CID information and that utilize spectrum dependent hardware must document spectrum certification of that hardware.	5.c.5
Information Warfare Protection	IV.D.4	C4ISR systems, which support the CID FoS, must be protected from compromise or intentional corruption by enemy IW attacks to prevent the loss of CID information/data.	2.b 4.d.3 4.d.4
Joint Technical Architecture Compatible	IV.D.5	All systems and sub-systems that will participate in the CID FoS must comply with applicable information technology standards within the DoD Joint Technical Architecture.	5.c.2
Joint Interoperability Test Command Certification	IV.D.6	All systems and sub-systems that will participate in the CID FoS must pass an interoperability certification performed by Joint Interoperability Test Command.	5.c.2

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APPENDIX K**

CAS CRD to JTRS Crosswalk			
CRD Section Heading	CRD Para #	CROSSWALK ITEMS	Para
		C4I	
	IV-E-1-c	C4I Systems that are Modular, Scalable, Ruggedized and Reliable	4.a.1(b) 4.c(1) 4.d(7)
	IV-E-1-d	Multiple Security Levels (MSLs) for All Operations and Intelligence	4.a.2(b)
	IV-E-1-j	Redundant, Interoperable, Filterable and Seamless (to the user) Systems	4.a.1(h) 4.a.1(r) 4.a.3(b)
	IV-E-1-k	Near Real Time/Real Time Battlespace Awareness (BA)	NA
	IV-E-1-l	Common C4ISR Architecture	5.c(1)
	IV-E-1-n	Reachback Capability	1.e(f) 4.a.1(f)
	IV-E-1-o	Operations in the Nuclear, Biological and Chemical (NBC) Environment	4.d(7)
	IV-E-1-p	Common Operational Picture (COP)/Common Tactical Picture (CTP)	1.e.f(7) 4.a.3(h)

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APPENDIX L

CRD Para	TAMD CRD to JTRS Crosswalk	ORD Requirement
C4I CAPABILITIES		
IV-B-1	KPP-JOINT AND MULTINATIONAL C4I INTEROPERABILITY JTA Compliance: Table IV-3 Compliance:	4.a.(1)(i); 4.a.(3); 5.c.(1) 5.d.(1) 4.a.(1)(b); 5.c.(2) 4.a.(1)(r); Appendix E
IV-B-2	TAMD INFORMATION AND DATA NEEDS	N/A
	Planning Information:	
	Battle Management Information:	4.a.(1)(b)
	Fire Control Data:	
IV-B-3	COMBAT IDENTIFICATION	N/A
IV-B-4	SURVEILLANCE, DETECTION, AND TRACKING	N/A
IV-B-5	INTEROPERABLE PLANNING AND DECISION SUPPORT	N/A
IV-B-6	KPP-SINGLE INTEGRATED AIR PICTURE	N/A
IV-B-7	JOINT DATA NETWORK MANAGEMENT/JOINT INTERFACE CONTROL	4.a.(4)
IV-B-8	OPERATIONS WITH ALLIES AND COALITION FORCES	5.c.(2)&(7)
IV-B-9	SANITIZED INTELLIGENCE INFORMATION	N/A
IV-B-10	INDEPENDENT OPERATIONAL SUPPORT	N/A
IV-B-11	AUTOMATED BATTLE MANAGEMENT AIDS	N/A
IV-B-12	INTEGRATED FIRE CONTROL	
	Battle Management:	4.a.(1)(b)
	Remote Engagement:	N/A
IV-B-13	BANDWIDTH/FREQUENCY MANAGEMENT/CAPACITY	4.d.(13)
IV-B-14	INTELLIGENCE PREPARATION OF THE BATTLESPACE	N/A
IV-B-15	SPECIAL OPERATIONS FORCES	N/A
OCA ATTACK OPERATIONS CAPABILITIES		
IV-C-1	OCA ATTACK OPERATIONS RSTA	N/A
IV-C-2	RSTA INFORMATION PROCESSING	N/A
IV-C-3	KPP-OCA ATTACK OPERATIONS TIMELINES	N/A
IV-C-4	OCA ATTACK OPERATIONS ENGAGEMENT EFFECTIVENESS	N/A
IV-C-5	BATTLE DAMAGE ASSESSMENT	N/A
DCA ACTIVE AIR DEFENSE CAPABILITIES		
IV-D-1	KPP-TARGET ENGAGEMENT AND NEGATION	N/A
IV-D-2	REMOTE ENGAGEMENT	N/A
IV-D-3	KPP-MINIMUM NEGATION ALTITUDE AGAINST TBMs	N/A
IV-D-4	ABT KEEP-OUT RANGE	N/A
IV-D-5	ENGAGEMENT ASSESSMENT	N/A
IV-D-6	INDEPENDENT OPERATIONS	N/A
DCA PASSIVE AIR DEFENSE CAPABILITIES		
IV-E-1	KPP-TBM ATTACK EARLY WARNING	N/A
IV-E-2	TBM ATTACK EARLY WARNING	N/A
IV-E-3	WMD WEAPONS EFFECTS AREA PREDICTION	N/A
IV-E-4	INDUCING ENEMY TARGETING ERROR	N/A
IV-E-5	C4I RE-ESTABLISHMENT	N/A
IV-E-6	SIGNATURE REDUCTION	4.d.(1)&(6)

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V-E-7	TRANSPORTABILITY & MANEUVERABILITY	5.g.
GENERAL CAPABILITIES		
IV-F-1	TRANSPORTATION	5.g.
IV-F-2	TEST/TRAINING/EXERCISE CAPABILITIES	5.e.(2)
IV-F-3	MODELING AND SIMULATION	N/A
IV-F-4	RECORD AND PLAY BACK CAPABILITY	N/A
IV-F-5	SURVIVABILITY	4.d.(7)&(12); Annexes A,B,C
IV-F-6	INFORMATION OPERATIONS	4.d.(2) & (3); 5.c.(9)
IV-F-7	ELECTROMAGNETIC EFFECTS (E3) AND SPECTRUM CERTIFICATION	4.d.(4),(11)& (15);5.c.(5)
IV-F-8	OPERATIONAL SUITABILITY AND INFRASTRUCTURE	N/A
	(1) Reliability/Availability/Maintainability:	4.a.(1)(s); 4.c.(1)
	(2) Human System Integration:	5.e.
	(3) Logistics Supportability:	4.a.(1)(b); 4.c.; 5.a.,b.,&f
	(4) Computers and Communications Supportability:	4.a.(1)(j); 5.d.
	(5)Packaging, Handling, Storage, Transportability:	N/A
	(6) Environmental Effects:	4.d.(7); 5.d.4
	(7) Documentation:	N/A
	(8) GI&S Support:	5.h.
	(9) Natural Environmental Support:	N/A
	(10) Compliance with Treaties/International Agreements:	4.d.(11); 5.c.(2)&(7)
	(11) Intelligence Infrastructure Support:	
	(12) Security:	4.a.(2);5.c.(4)
IV-F-9	MULTINATIONAL RELEASABILITY	5.c.(7)

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GLOSSARY**

PART I – ACRONYMS

ABCS	Army Battle Command System
ACAT	Acquisition Category
ACUS	Area Common User System
AJ	Anti-Jam
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ANS	Advanced Narrowband System
A(o) or A _o	Operational Availability
APCO	Association of Public Safety Communications Officials
BIT	Built In Test
BITE	Built-In-Test Equipment
BLOS	Beyond Line-Of-Sight
C4ISR	Command, Control, Communication, Computers Intelligence-Surveillance and Reconnaissance
CAIV	Cost As An Independent Variable
CCI	Controlled Cryptographic Item
CIBS-M	Common Integrated Broadcast Service - Module
CIO	Chief Information Officer
CMF	Common Message Format
COIC	Critical Operational Issues and Criteria
CONOPS	Concept of Operations
CRD	Capstone Requirements Document
DAMA	Demand Assigned Multiple Access
DASA	Demand Assigned Single Access
DIA	Defense Intelligence Agency
DII/COE	Defense Information Infrastructure/Common Operating Environment
DISA	Defense Information System Agency
DISN	Defense Information Systems Network
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership/Education, Personnel and Facilities
DWTS	Digital Wideband Transmission System
EKMS	Electronic Key Management System
EMP	Electromagnetic Pulse
EPLRS	Enhanced Position Location Reporting System
EPLRS	Enhanced Position Location Reporting System
ESH	Environmental, Safety and Health
FBCB2	Force XXI Battle Command Battalion/Brigade and Below
FCC	Federal Communications Commission
FCS	Future Combat System
FDD (WNW)	Functional Description Document
FM	Frequency Modulation
FOC	Full Operational Capability
FNBDT	Future Narrowband Digital Terminal
FYDP	Future Year Defense Plan/Program
GATM	Global Air Traffic Management
GHz	Giga-Hertz
GIG	Global Information Grid
GPETE	General Purpose Electronic Test Equipment

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GPS	Global Positioning System
HEMP	High Altitude Electromagnetic Pulse
HERO	Hazards to Electromagnetic Radiation Ordnance
HCI	Human-Computer Interface
HF	High Frequency
HSSN	Home Station Support Node
IA	Information Assurance
IBS	Integrated Broadcast Service
IER	Information Exchange Requirement
IFF	Identification, Friend or Foe
INFOSEC	Information Security
IOC	Initial Operational Capability
ISB	Independent Sideband
ISYSCON	Information/Integrated System Control
IW	Information Warfare
JDIICS-D	Joint Defense Information Infrastructure Control System-Deployed
JPO	Joint Program Office
JTA	Joint Technical Architecture
JTR	Joint Tactical Radio
JTRS	Joint Tactical Radio System
JWNM	JTRS Wideband Network Manager
KPP	Key Performance Parameter
LAM	Light Attack Munitions
LMR	Land Mobile Radio
LOS	Line-Of-Sight
LPD	Low Probability of Detection
LPE	Low Probability of Exploitation
LPI	Low Probability of Interception
LRU	Line Replaceable Unit
MCEB	Military Communications Electronics Board
MELP	Mixed-Excitation Linear Predictive
MGRS	Military Grid Reference System
MHz	Mega-Hertz
MILSTAR	Military Strategic/Tactical Relay
MLS	Multi-Level Security
MNS	Mission Needs Statement
MSLS	Multiple Single Levels of Security
MUOS	Mobile User Objective System Common Air Interface
MSS	Mobile Satellite Services
NATO	North Atlantic Treaty Organization
NAVSTAR	Navigation Satellite Timing & Ranging
NBC	Nuclear, Biological, Chemical
NEO	Non-Combatant Evacuation Operations
NIST	National Institute of Standards and Technology
NLOS	Non-Line of Sight
NPT	Network Planning Tool
NSA	National Security Agency
ONI	Office Of Naval Intelligence
OPFAC	Operational Facility
ORD	Operational Requirements Document

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OTAP	Over The Air Programming
OTAR	Over The Air Rekeying
OTAT	Over The Air Transfer
OTAZ	Over The Air Zeroization
P ³ I	Preplanned Product Improvement
PSK	Phase Shift Keying
RF	Radio Frequency
SABI	Secret and Below Interoperability
SATCOM	Satellite Communications
SATURN	Second Generation Anti-jam Tactical UHF Radio for NATO
SCA	Software Communications Architecture
SCORM	Sharable Content Object Reference Model
SFF	Small Form Fit
SINCGARS	Single Channel Ground and Airborne Radio System
SIP/ASIP	System Improvement Program/Advanced System Improvement Program
SUO/SAS	Small Unit Operations Situational Awareness System
SPETE	Special Purpose Electronic Test Equipment
SSB	Single Side Band
STANAG	Standardization Agreement (NATO)
STRAP	System Training Plan
TADSS	Training Aids, Devices, Simulators and Simulations
TDDS	TRAP Data Dissemination System
TIBS	Tactical Information Broadcast Service
TRANSEC	Transmission Security
TRAP	Tactical Related Applications
TRIXS	Tactical Reconnaissance Information Exchange Service
TS	Top Secret
TS-SCI	Top Secret/Sensitive Compartmented Information
UAV	Unattended Aerial Vehicle
UGS	Unattended Ground Sensor
UGV	Unattended Ground Vehicle
UHF	Ultra High Frequency
VHF	Very High Frequency
WIN-T	Warfighter Information Network-Tactical
WNW	Wideband Networking Waveform

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GLOSSARY

PART II – Terms and Definitions

Authentication. Security measure designed to establish the validity of a transmission, message, or originator, or a means of verifying an individual's authorization to receive specific categories of information.

Availability. Timely, reliable access to data and information services for authorized users.

Benign Fill. Process enabling operational keys to be generated, distributed, and loaded into compatible cryptographic end equipment without human exposure to unencrypted key. This includes the loading of all cryptographic key material into the end equipment.

Cellular Radio. Commercial waveform for terrestrial-based cellular telephone system.

Channel. An independent operational capability providing a waveform capability. A channel is a single processing path within a single JTR Set that supports all functionality required by a specific waveform. A channel may involve half-duplex or full-duplex operation, two hardware channels may be required for full-duplex operation.

Channel Operational Availability A(o). Channel A(o) is the proportion of time a channel is either operating or is capable of operating when used in a specific manner in a typical maintenance and supply environment. All calendar time when operating in an approved operational scenario, is considered.

Channel A(o) is defined as a measure of the degree to which a channel is in an operable state at the start of a mission when the mission is called for at a random point in time.

Channel A(o) is a single overall measure of each channel of JTR System to remain in a fully operational status when used in an approved operational environment. All hardware (e.g., cables, power supply, antennas, etc.) and software (e.g., configuration templates, waveform data sets, crypto data input software, etc.) failures of a JTR System configuration will be considered downing events in the evaluation of channel A(o). Failures that render all channels down will impact the A(o) of each channel. Failures that prohibit the change/alteration of a JTR System configuration as called for during an operational mission will impact the A(o) of the channels involved in the attempted action.

COBRA. A National Reconnaissance Office program that defines a signal architecture and waveform standard for overt and covert operations.

Cognizant Authority. Spectrum/Frequency management element at different levels and missions (e.g., Installation, WING, FLEET, MEF, CORP, COCOM, JTF, CJCCC).

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Communication. Communication is information transfer, among users or processes, according to agreed conventions.

Compatibility. Capability of two or more items or components of equipment to exist or function in the same system or environment without mutual interference. Note: The Term compatibility does not have the same meaning as interoperability, but it is usually a necessary condition for it.

Component. A component is an assembly or part thereof that is essential to the operation of some larger assembly and is an immediate subdivision of the assembly to which it belongs

Confidentiality. Assurance that information is not disclosed to unauthorized persons, processes, or devices.

Core Capability. The core capability includes the following: 1. The set of functions that define a significant, stand-alone, operationally effective, and suitable military capability such that, should no further development occur, the user will have received a significant capability. 2. The integral characteristics of the system that, if altered in subsequent increments, would lead to significant redesign of the evolutionary system.

Cryptographic Algorithm Categories.

Type 1 Algorithm (Suite A)	Classified and Sensitive US Government information.
Type 1 Algorithm (Suite B)	Coalition Releasable information
Type 2 Algorithm	Unclassified Algorithm, endorsed by NSA for use in National Security Systems as defined in Title 40 U.S.C. Section 1452.
Type 3 Algorithm	Cryptographic Algorithm registered by the NIST and published as a Federal Information Processing Standard (FIPS) for use in protecting unclassified sensitive information or commercial information.
Type 4 Algorithm	Unclassified cryptographic algorithm that has been registered by NIST, but not published as a FIPS.

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Data Rates. The aggregate rates at which data pass a point in the transmission path of a system. LOW, MEDIUM and HIGH Data rates are further defined in applicable MIL STDs for applicable waveform and system usages.

Domain. A domain is an independent variable used to express a function. Examples of domains are time, frequency, and space. In a larger sense, a domain is an area of common operational and functional requirements. *The variables that differentiate JTR domains are the operating environment of user platforms on which JTR sets are mounted. The three JTR domains are airborne, maritime/fixed, and ground.*

Dynamic Frequency Management/Allocation. The selection of operating frequencies intelligently by sensing the environment and selecting the frequency such that operation of the JTR set does not interfere with other RF systems.

Functional Description Document for the WNW: The Functional Description Document (FDD) defines the Wideband Networking Waveform (WNW) user requirements and specifications.

Embedded. An embedded system is some combination of computer hardware and software; either fixed in capability or programmable that is specifically designed for a particular kind of application device.

Embedded Cryptography. NSTISSI No. 4009 dated January 1999 defines embedded cryptography simply as “Cryptography engineered into an equipment or system whose basic function is not cryptographic.” For JTR System context this means placement of a chip, module or subsystem dedicated to performing cryptographic operations as a component in communications or information processing equipment in a certified manner. This cryptography or cryptographic resource must interface with remaining JTR System components in accordance with the Software Communication Architecture and its supplements. It must also properly support approved JTRS waveforms instantiated in/on the JTR set. Specific physical location of the embedded cryptography is not defined by the terms “embedded” or “JTR System compliant” since detailed implementation approaches may vary. In a JTR set, embedded cryptography cannot be realized by simply connecting to existing legacy cryptographic hardware devices (such as KG-40, KG-84, etc) or bulk/in-line encryptors.

Flexibility in Form Factor. The flexibility of form factor relates to the ability of a set to be adapted into configurations for integration into the various platforms.

Gateway. A gateway in a communications network is a network node equipped for interfacing with another network that uses different protocols. A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires that mutually acceptable administrative procedures be established between the two networks. A protocol translation/mapping gateway

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interconnects networks with different network protocol technologies by performing the required protocol conversions.

A multi-channel JTR set includes inter-network gateway services between its channels or networks.

Hardware Configuration. A hardware configuration is a set of interconnected equipment forming a system. *The hardware of a particular JTR set will be physically configured for operating specific waveforms to meet needs of specific platforms.*

Hybrid Network. A hybrid network uses a combination of line facilities, i.e., trunks, loops, or links, some of which use only analog or quasi-analog signals and some of which use only digital signals.

Identification. Process in Information Security used to recognize a known entity.

Information Assurance (IA). Information Operations (IO) that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. This includes providing for restoration of information systems by incorporating protection, detection, and reaction capabilities. Computer Network Defense (CND) is an operational component of IA and a core capability of IO that provides guidance and response to specific threats.

Installation Kit. An installation kit supports the physical installation of a specific system on a specific type of user platform.

Instantiate. An operator action to select a software waveform from a radio sets stored waveforms and activates the waveform on a JTR Set hardware channel.

Integrity. Quality of an IS reflecting the logical correctness and reliability of the operating system; the logical completeness of the hardware and software implementing the protection mechanisms; and the consistency of the data structures and occurrences of the stored data. Note that, in a formal security mode, integrity is interpreted more narrowly to mean protection against unauthorized modification or destruction of information.

Inter-Networking. Inter-networking is the process of inter-connecting two or more individual networks to facilitate communications between nodes of the inter-connected networks. Each network may be distinct, with its own addresses, internal protocols, access methods, and administration. *Individual networks connected to form a JTR inter-network will share the same general operating mode, i.e. voice, data, or video.*

Interoperability Categories. Wireless interoperability can generally be achieved by the use of one of the following four categories:

1. Same Radio - (Direct interoperability, at least within the same system or operational domain. Examples: SINCGARS among ground forces, or JTR System among all services, etc.)

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2. Common Waveform - (Direct interoperability, across different domains or among different equipment. Example: SINCGARS waveform between SINCGARS and JTR System radio sets.)

3. Gateways & Relays - (Indirect interoperability, and/or for range extension (usually automatic), may include conversion of frequencies, modes, protocols, cryptographic cover, etc., and may be in real or non-real-time. Example: JTR Set employed to “patch” a SINCGARS net to a HAVE QUICK net. See also “gateway” and “route and retransmission.”)

4. Equipment Duplication - (Indirect interoperability (usually manual), using multiple “stovepipe” radios, may be employed due to time, operational, security, or other constraints, and often the first (and usually inefficient) choice. Example: Stack of non-interoperable radios with very busy operator.)

Inter-Operability. Inter-operability is the condition achieved among communications-electronics systems or items of equipment when information or services can be exchanged directly and satisfactorily between them and their users. *For example, interoperability could be established between a SINCGARS voice net and another system voice net through a transparent interface of a JTR set operating simultaneously in both nets.*

JTR Family. The JTR family is a generic reference to the aggregate of all JTR sets and configurations. Also, see JTR Set and JTR System.

JTR Set. A JTR set is integrated on a user's platform as a completely functional configuration of radio communications hardware and software that provides the full range of JTR System services required by the user system. The JTR Set may include one or more operating components. A JTR set does not include the user's host system computer, but does provide all aspects of radio communications and network services intended for the user's host system. A JTR set includes, but is not limited to such items as receiver-transmitters; microphones and speakers, antennae; power amplifiers; cryptographic subsystem, batteries for man pack sets; interconnecting cables; platform installation kits, routers and other networking components; etc. *JTR set examples:*

Set 1. Hand-held 1-channel/1 mode HF voice radio, power, and antenna.

Set 2. Hand-held 1-channel/1 mode VHF voice radio, power, and antenna.

Set 3. Hand-held or (man pack 2-channels/2modes VHF voice/VHF data radio, power, and antenna.

Set 4. Vehicular or Aviation 3-channels/2modes VHF voice/VHF data/UHF/data radio, inter-networking components, power, antenna, platform installation kit, etc.

Set 5. A 6 channels/2modes JTR Set, designed for interim use during the transition from legacy radios to JTR Set, could be comprised of 1 software-defined radio programmed for 3 channels (e.g. SINCGARS voice net 1, SINCGARS voice net 2, and HAVEQUICK voice net); 3 adjunct legacy radios (e.g. JTIDS, EPLRS and UHF DAMA/DASA); and the means to inter-connect the channels as required for inter-networking.

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JTR System (JTRS). JTR System is a generic reference to the system that encompasses the aggregate of all aspects and components (including JTR Sets) that constitute and enable the installation, operation, and maintenance of the JTR System communications architecture. Unless explicitly stated otherwise, in this ORD JTRS is a collective term that refers to the entire system.

Latency. Latency is a quality or state of being that is marked by suspension of activity, or delay, in performing an operation. In an information transfer operation, latency is a measure of the time that elapses at various stages of the transfer. *The information latency that is attributable to the communications means is the elapsed time from when a user terminal submits information to the means until the information is submitted to the intended user terminal. Ideally, information will flow across the JTR System networks with near-zero latency.*

Line Replaceable Unit (LRU). A box or assembly that is installed or removed from the JTR Set by the operator/maintainer as a single serviceable entity.

Link IIB. Waveform for full duplex information link.

Link 4A. Waveform for unsecured point-to-point information link.

Link 16. Waveform for node less TDMA (Time Division Demand Multiple Access) information link.

Local. (In context of JTR System control and management) by means of integral, attached, on board, or other proximal means, such as front panel, cockpit display, or similar nearby control device.

Multilevel Security. Concept of processing information with different classifications and categories that simultaneously permits access by users with different security clearances and denies access to users who lack authorization.

Multiple Single Levels of Security. A processing system in which information at different levels of classification is processed, but the information is not combined in any way.

Mobile Code. Mobile code is technology that allows for the creation of executable information that can be delivered to an information system and directly executed on any hardware/software architecture that has an appropriate host execution environment. This policy is focused on the receipt of executable information from sources outside the Designated Approving Authority's area of responsibilities. Therefore, for the purposes of this policy, mobile code is software obtained from remote systems outside the enclave boundary, transferred across a network, and then downloaded and executed on a local system without explicit installation or execution by the recipient.

Mobile Satellite Service (MSS). Commercial satellite networks; provides beyond line-of-sight connectivity for commercial mobile telephones (e.g., Iridium, Globalstar).

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Mode S Level 4. IFF waveform.

Modular/Module. Modular pertains to a design concept in which interchangeable units are used to create a functional product. A module is an interchangeable subassembly that constitutes part of a larger device or system. A modular system is constructed with standardized units or dimensions for flexibility and variety in operational use and cost-effective modifications to either hardware or software. Modularity may be scaled to any system functional or design level that promotes desired efficiency.

Mobile User Objective System. The Mobile User Objective System (MUOS) will be a system of systems supporting narrowband (64 kbps and below) beyond line-of-sight connectivity for worldwide mobile and fixed-site terminals.

Mode 4. Mode 4 is the secure IFF waveform currently in use.

Mode 5. Mode 5 is the secure IFF waveform designed as an upgrade to Mode 4 defined by STANAG 4193.

Multi-Band Operation. Multi-band refers to operations in the frequency spectrum between limits of defined frequency bands for two or more channels, radios, or networks. *Multi-band JTR operations may use several different transmission channels (frequencies), waveforms, or networks to pass information between user terminals.*

Multi-mode Operation. Multi-mode operation refers to a capability to operate more than one mode on a channel, radio, or system. *Multi-mode JTR sets will operate to exchange information using voice, video, or data modes.*

Network. A network is an inter-connection of three or more communicating entities.

Network Administration. Network administration is a group of network management functions that provide support services; ensure that the network is used efficiently; and ensure that prescribed service quality objectives are met. Network administration may include activities such as network address assignment, assignment of routing protocols and routing table configuration, and directory service configuration.

Network Architecture. Network architecture is the design principles, physical configuration, functional organization, operational procedures, and data formats used as the basis for the design, construction, modification, and operation of a communications network.

Network Bridge. A network bridge is a device that links or routes signal from one network to another.

Network Interface. Network interface is the point of interconnection between a user terminal and a network or between one network and another network. *The JTR Sets will provide the means for*

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interface of user terminals to individual networks (e.g. EPLRS, SINCGARS) and between networks (e.g. between EPLRS and SINCGARS data networks).

Network Management. Network management is execution of a set of functions required for controlling, planning, allocating, deploying, coordinating, and monitoring the resources of a telecommunication network. Network management includes performing functions such as initial network planning, frequency allocation, predetermined traffic routing to support load balancing, cryptographic key distribution authorization, configuration management, fault management, security management, performance management, and accounting management. Network management does not usually include management of user terminal equipment (See also System Management).

Network User. A person, organization, or system that employs the services provided by a telecommunication network for transfer of user information.

Node. A general term used to describe either a terminal connection point common to two or more branches of a network; a switch forming a network backbone; patching and control facilities; technical control facilities.

Open System. An open system has characteristics that comply with specified, publicly maintained, readily available standards.

Open Systems Architecture. Open systems architecture is non-proprietary. Open systems architecture is the layered hierarchical structure, configuration, or model of a communications or distributed data processing system that:

- (a) Enables system description, design, development, installation, operation, improvement, and maintenance to be performed at a given layer or layers in the hierarchical structure.
- (b) Allows each layer to provide a set of accessible functions that can be controlled and used by the functions in the layer above it.
- (c) Enables each layer to be implemented without affecting implementation of other layers.
- (d) Allows the alteration of system performance by the modification of one or more layers without altering the existing equipment, procedures, and protocols at the remaining layers.

Over-the-Air Rekeying. Changing traffic encryption key or transmission security key in remote crypto-equipment by sending new key directly to the remote crypto-equipment over the communications path it secures.

Over-the-Air-Transfer. Electrically distributing key without changing traffic encryption key used on the secured communications path over which the transfer is accomplished.

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Over-the-Air-Zeroization. Effecting a zeroize in a remote crypto-equipment by sending an authenticated "zeroize" command directly to the remote crypto-equipment over the communications path it secures.

Programmable. Programmable pertains to a device that accepts instructions (usually via software) that alter its basic functions.

Protocol. A protocol is a formal set of conventions governing the format and control of interaction among communicating functional units. In layered communications system architecture, a protocol is a formal set of procedures that are adopted to facilitate functional inter-operation within the layered hierarchy.

Protocol Converter. A protocol converter is a functional unit that uses a specified algorithm to translate a bit-stream from one protocol to another protocol to enable inter-operation between the two using systems.

Protocol Translator. In a communications system, a protocol translator is the collection of hardware, software, firmware, or any combination of these, that is required or used to convert the protocols used in one network to those used in another network. (e.g., Link 16 VMF to 188-220) (Also, see Gateway).

Radio Net. An organization of radio sets directly communicating on a common channel or frequency.

Radio Network. An interconnection of three or more radio sets communicating with each other, but not necessarily on the same channel or frequency (*e.g. a multi-channel network that may choose one or more available channels for a communications session between its nodes*).

Remote. (In context of JTR System control and management) by means of non-integral, detached, or other distal means, such as remote control panel, JTR System network management system, or similar distant control device, normally linked to the JTR Set by wired, wireless, or optical means.

Route and Retransmission. (Previously termed "cross-banding," a generic "gateway & relay" functionality, and used herein in the context of JTR Sets.) The capability to automatically and satisfactorily exchange user information between JTR System channels, normally to achieve interoperability and/or range extension, with the following example characteristics:

1. Normally employs like modes, such as voice, or data, or video, and
2. If data, at like rates (normally with buffers and flow control).
3. May include user information conversion, such as voice vocoder or data element format.
4. May include COMSEC conversion ("RED patch").
5. Normally in real or near-real time (and potentially non-real-time).
6. Normally between two (or more) JTR System channels, for different bands, frequencies, waveforms, propagation coverages, etc., but

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7. May be between different user links on a single channel (such as via non-real time alternate retransmission, etc.)”

For example, in a JTR set operating the data mode simultaneously in two SINCGARS data nets and one EPLRS net, routing and retransmission of data flow can be accomplished between source nodes of one net and destination nodes of one or both other nets. Routing and retransmission in the JTR System may include use of multi-link operations.

SATURN. Waveform for Second-generation Anti-jam Tactical UHF Radio for NATO.

Scaleable System Design. A scaleable system design provides graduated levels of service or capabilities to fit various user needs. *The degree to which a system may be scaleable is related to the degree to which the system components are modularized.*

Seamless. A condition that exists in a communications network whereby connectivity and throughput is accomplished without manual intervention.

Small Form Fit. In the context of a JTR Set, a small form fit set is a small lightweight radio transceiver communication device (e.g., card, module, subsystem, etc.) dedicated to performing radio transport functions that can be integrated into warfighter equipment, munitions, and sensors.

Software Communication Architecture. It is an architecture framework in that it is precise in areas where reusability is affected and it is general in other areas so that unique requirements of implementation determine the specific application of the architecture. The Software Communication Architecture defines the hardware and software at different levels of detail to allow the broadest reusability and portability of components.

Software Programming. A sequence of coded instructions that can be inserted/loaded into a computer hardware system; *e.g., a software load for waveforms can be loaded into the radio set hardware configuration.*

Soldier Radio. Land Warrior system radio/intercom component.

Systems Interface. A systems interface is a place that systems meet and communicate with each other. *For example, two radios equipped only with dissimilar waveforms cannot "meet in the air" to communicate, i.e. they cannot inter-operate. A common medium (interface) is needed in order for these two radios to communicate. A JTR set may provide the interface between systems, channels, nets, or networks.*

System High Mode. Information System (IS) security mode of operation wherein each user, with direct or indirect access to the IS, its peripherals, remote terminals, or remote hosts, has all of the following:

- a. Valid security clearances for all the information within an IS.
- b. Formal access approval and signed nondisclosure agreements for all the information stored and/or processed (including all compartments, subcompartments, and / or special access programs).

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- c. Valid need-to-know for some of the information contained within the IS.

System Management. System management extends network management functions to include subscriber elements or user end instruments in cases where separate system management is not provided directly by user nodes.

Tactical Communications System. A tactical communications system is used within or in direct support of tactical forces and is designed to meet the requirements of changing tactical situations and varying environmental conditions. It provides securable communications (*e.g. voice, data, and video*) among mobile users to facilitate command and control of tactical forces. A tactical communications system usually requires extremely short installation times in order to meet the requirements of frequent relocation.

Transmission Security (TRANSEC). A component of COMSEC resulting from the application of measures taken to protect transmissions from interception and exploitation by means other than cryptanalysis (Cryptanalysis is defined as “Operations performed in converting encrypted messages to plain text without initial knowledge of the crypto-algorithm and /or key employed in the encryption.”). Transmission security is the protection of the communications paths against attack. Defensive measures include anti-jam, low probability of detection, low probability of intercept, spread spectrum techniques such as frequency hopping and direct sequence spreading, and protected distribution.

Transparent Interface. A transparent interface allows the connection and operation of two or more systems, subsystems, or equipment without modification of characteristics or operational procedures on either side of the interface. *For example, a JTR Set operating in a SINCGARS data net on one channel and an EPLRS data net on a second channel will provide the means for a transparent interface between the two nets. Thus, nodes in the SINCGARS net and nodes in the EPLRS net can transfer data between each other through the JTR Set with neither user being aware of the path or means that enabled the transfer.*

Transparent Network. A transparent telecommunications network allows a transmission system or channel to accept, at its input, unmodified user information, and deliver corresponding user information at its output, unchanged in form or information content. The user information may be changed internally within the transmission system, but it is restored to its original form prior to the output without the involvement of the user. *As stated above for networks, a transparent JTR inter-network will deliver the content of user information unchanged to the destination terminal. However, the JTR inter-network may change the form of transmitted user information to be compatible with the destination user terminals or network.*

Virtual JTR Inter-Network. A virtual JTR inter-network provides virtual circuits using the facilities of two or more real networks. Each type of JTR inter-network (voice, data, or video) is a virtual network that uses real networks linked together by JTR sets.

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Waveform. A waveform is the representation of a signal that includes the frequency, modulation type, message format, and/or transmission system. *In general usage, the term waveform refers to a known set of characteristics, for example, frequency bands (VHF, HF, UHF), modulation techniques (FM, AM), message standards (Link 16), and transmission systems (. SINCGARS, EPLRS, HAVEQUICK). In JTR System usage, the term waveform is used to describe the entire set of radio functions that occur from the user input to the RF output and vice versa. A JTR System "waveform" is implemented as a re-useable, portable, executable software application that is independent of the JTR System operating system, middleware, and hardware.*

Wide-Band. A wide band circuit may have a bandwidth wider than normal for the type of circuit, frequency of operation, or type of modulation. *In common usage, "wide-band" refers to a high capacity for information transfer. In JTR System usage, wide-band refers to a networked radio waveform that has a node-to-node capacity for information transfer of 512 Kbps or greater.*

Zeroization. Remove or eliminate all RED keys and erase all classified data resident in unencrypted form.

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